



F R I E D R I C H

2011

**SPLIT TYPE ROOM AIR CONDITIONER
WALL MOUNTED TYPE**



Models

Indoor Unit	MW09C1H	MW12C1H
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Outdoor Unit	MR09C1H	MR12C1H
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Model and product code

Voltage range	Complete unit model	Indoor unit model	Outdoor unit model
115V ~ 60HzM	M09CIH	MW09CIH	MR09CIH
115V ~ 60HzM	M12CH	MW12CIH	MR12CIH

Summary and features

OutdoorUnit

MR09CIH
MR012CIH



Remote control window



IMPORTANT SAFETY INFORMATION


The information contained in this manual is intended for use by a qualified service technician who is familiar with the safety procedures required for installation and repair, and who is equipped with the proper tools and test instruments required to service this product.

Installation or repairs made by unqualified persons can result in subjecting the unqualified person making such repairs as well as the persons being served by the equipment to hazards resulting in injury or electrical shock which can be serious or even fatal.

Safety warnings have been placed throughout this manual to alert you to potential hazards that may be encountered. If you install or perform service on equipment, it is your responsibility to read and obey these warnings to guard against any bodily injury or property damage which may result to you or others.

Your safety and the safety of others are very important.

We have provided many important safety messages in this manual and on your appliance. Always read, understand and obey all safety messages.




This is a safety Alert symbol.


This symbol alerts you to potential hazards that can kill or hurt you and others.

All safety messages will follow the safety alert symbol with the word "WARNING" or "CAUTION".

These words mean:

 **WARNING**

You can be killed or seriously injured if you do not follow instructions.

 **CAUTION**

You can receive minor or moderate injury if you do not follow instructions.

All safety messages will tell you what the potential hazard is, tell you how to reduce the chance of injury, and tell you what will happen if the instructions are not followed.

NOTICE

A message to alert you of potential property damage will have the word "NOTICE". Potential property damage can occur if instructions are not followed.

PERSONAL INJURY OR DEATH HAZARDS

ELECTRICAL HAZARDS:

- Unplug and/or disconnect all electrical power to the unit before performing inspections, maintenance, or service.
- Make sure to follow proper lockout/tag out procedures.
- Always work in the company of a qualified assistant if possible.
- Capacitors, even when disconnected from the electrical power source, retain an electrical charge potential capable of causing electric shock or electrocution.
- Handle, discharge, and test capacitors according to safe, established, standards, and approved procedures.
- Extreme care, proper judgment, and safety procedures must be exercised if it becomes necessary to test or troubleshoot equipment with the power on to the unit.

5

- Do not spray or pour water on the return air grille, discharge air grille, evaporator coil, control panel, and sleeve on the room side of the air conditioning unit while cleaning.
- Electrical component malfunction caused by water could result in electric shock or other electrically unsafe conditions when the power is restored and the unit is turned on, even after the exterior is dry.
- Never operate the A/C unit with wet hands.
- Use air conditioner on a single dedicated circuit within the specified amperage rating.
- Use on a properly grounded outlet only.
- Do not remove ground prong of plug.
- Do not cut or modify the power supply cord.
- Do not use extension cords with the unit.
- Follow all safety precautions and use proper and adequate protective safety aids such as: gloves, goggles, clothing, adequately insulated tools, and testing equipment etc.
- Failure to follow proper safety procedures and/or these warnings can result in serious injury or death.

REFRIGERATION SYSTEM REPAIR HAZARDS:

- Use approved standard refrigerant recovering procedures and equipment to relieve pressure before opening system for repair.
- Do not allow liquid refrigerant to contact skin. Direct contact with liquid refrigerant can result in minor to moderate injury.
- Be extremely careful when using an oxy-acetylene torch. Direct contact with the torch's flame or hot surfaces can cause serious burns.
- Make sure to protect personal and surrounding property with fire proof materials.
- Have a fire extinguisher at hand while using a torch.
- Provide adequate ventilation to vent off toxic fumes, and work with a qualified assistant whenever possible.
- Always use a pressure regulator when using dry nitrogen to test the sealed refrigeration system for leaks, flushing etc.
- Make sure to follow all safety precautions and to use proper protective safety aids such as: gloves, safety glasses, clothing etc.
- Failure to follow proper safety procedures and/or these warnings can result in serious injury or death.

MECHANICAL HAZARDS:

- Extreme care, proper judgment and all safety procedures must be followed when testing, troubleshooting, handling, or working around unit with moving and/or rotating parts.
- Be careful when, handling and working around exposed edges and corners of the sleeve, chassis, and other unit components especially the sharp fins of the indoor and outdoor coils.
- Use proper and adequate protective aids such as: gloves, clothing, safety glasses etc.
- Failure to follow proper safety procedures and/or these warnings can result in serious injury or death.

PROPERTY DAMAGE HAZARDS

FIRE DAMAGE HAZARDS:

- Read the Installation/Operation Manual for the air conditioning unit prior to operating.
- Use air conditioner on a single dedicated circuit within the specified amperage rating.
- Connect to a properly grounded outlet only.
- Do not remove ground prong of plug.
- Do not cut or modify the power supply cord.
- Do not use extension cords with the unit.
- Be extremely careful when using acetylene torch and protect surrounding property.
- Failure to follow these instructions can result in fire and minor to serious property damage.

WATER DAMAGE HAZARDS:

- Improper installation, maintenance or servicing of the air conditioner unit can result in water damage to personal items or property.
- Insure that the unit has a sufficient pitch to the outside to allow water to drain from the unit.
- Do not drill holes in the bottom of the drain pan or the underside of the unit.
- Failure to follow these instructions can result in damage to the unit and/or minor to serious property damage.

Model			Outdoor Unit MR09C1H	
Function			COOLING	
Rated Voltage			115V~	
Frequency (Inverter different Compressor speed)	High	Hz	70	
	Standard	Hz	41	
	Low	Hz	15	
Total Capacity (Inverter different Compressor speed)	High	W / Btu/h	3100/10600	
	Standard	W / Btu/h	2650/9000	
	Low	W / Btu/h	1300/4435	
Power Input (Inverter different Compressor speed)	High	W	1050	
	Standard	W	640	
	Low	W	180	
Rated Input	High	W	1050	
	Standard	W	640	
Rated Current	High	A	16.8	
	Standard	A	7.0	
Air Flow Volume	Turbo	CFM	330	
	H	CFM	294	
	M	CFM	253	
	L	CFM	218	
Dehumidifying Volume		pints/hour	1.69	
STD		W/W	14.0	
			22	
Indoor unit			MW09CIH	
Fan Motor	Speed	Turbo	r/min	1260
		H	r/min	1050
		M	r/min	920
		L	r/min	730
	Output		W	20
	Capacitor		μF	4.0
RLA		A	0.38	
Fan	Type		Cross flow fan	
	Diameter-Length		in. 3.62 X 25.4	
Evaporator	Aluminum fin-copper tube			
	Pipe Diameter		in. 216	
	Row-Fin Gap		in. 0.019 - 0.055	
	Coil length (l)×height (H)×coil width (L)		in. 25.4 X 1 X 10.5	
Swing Motor	Model		MP24AA	
	Output		W 2.4	
Fuse (A)		A	PCB 3.15A	
Sound Pressure Level	H	dB (A)	34	
	M	dB (A)	30	
	L	dB (A)	26	
Sound Power Level	H	dB (A)	44	
	M	dB (A)	40	
	L	dB (A)	36	
Dimension (W×H×D) (mm)		in.	33 1/4 X 10 7/8 X 7 1/8	
Dimension of Package (L×W×H)		in.	36X10X14	
Net Weight /Gross Weight		lbs	22	

Remarks:

Rating conditions are:

Cooling: Indoor air temperature 80°F D.B. / 67°F W.B.

Outdoor air temperature 95°F D.B. / 75°F W.B.

Heating: Indoor air temperature 70°F D.B./ 60°F W.B.

Outdoor air temperature 47°F D.B. / 43°F W.B.

12K of 115V Models

Model			Outdoor Unit MR12CH - SYSTEM	
Function			COOLING	
Rated Voltage			115	
Frequency (Inverter different Compressor speed)	High	Hz	70	
	Standard	Hz	41	
	Low	Hz	15	
Total Capacity (Inverter different Compressor speed)	High	W / Btu/h	4100/14000	
	Standard	W / Btu/h	3520/12000	
	Low	W / Btu/h	1320/4500	
Power Input (Inverter different Compressor speed)	High	W	1050	
	Standard	W	640	
	Low	W	180	
Rated Input	High	W	1050	
	Standard	W	640	
Rated Current	High	A	6.5	
	Standard	A	3.2	
Air Flow Volume	Turbo	CFM	300	
	H	CFM	277	
	M	CFM	253	
	L	CFM	218	
Dehumidifying Volume		pints/hour	2.54	
EER / C.O.P		W/W	12.00	
SEER/HSPF			22	
Indoor unit				
Fan Motor	Speed	Turbo	r/min	1260
		H	r/min	1050
		M	r/min	920
		L	r/min	730
	Output		W	20
	Capacitor		μF	1.0
RLA		A	0.2	
Fan	Type		Cross flow fan	
	Diameter-Length		in. 3.62X25.4	
Evaporator	Aluminum fin-copper tube			
	Pipe Diameter		in. .276	
	Row-Fin Gap		in. .077-.055	
	Coil length (l)×height (H)×coil width (L)		in. 25.4X1X10.5	
Swing Motor	Model		MP24AA	
	Output		W 2.4	
Fuse (A)		A	PCB 3.15A	
Sound Pressure Level	H	dB (A)	34	
	M	dB (A)	30	
	L	dB (A)	26	
Sound Power Level	H	dB (A)	44	
	M	dB (A)	40	
	L	dB (A)	36	
Dimension (W×H×D) (mm)		in.	33 1/4 X 10 7/8 X 7 1/8	
Dimension of Package (L×W×H)		in.	36X10X14	
Net Weight /Gross Weight		lbs	22	

Remarks:

Rating conditions are:

Cooling: Indoor air temperature 81°F D.B. / 66°F W.B.

Outdoor air temperature 95°F D.B. / 75°F W.B.

Heating: Indoor air temperature 70°F D.B./ 61°F W.B.

Outdoor air temperature 46°F D.B. / 43°F W.B.

Specifications

Outdoor Unit			MR09C1H
Compressor	Manufacturer/trademark		SANYO
	Model		C-6RZ110H1A
	Type		Twin rotary
	L.R.A. (A)	A	33
	RLA(A)	A	4.59
	Power Input(W)	W	800
	Overload Protector		Int11I-3979
Throttling Method			Electronic Expansion Valve throttling
Starting Method			Transducer starting
Working Temp Range		F°	41 - 115
Heat Exchanger Coil	Coil		Aluminum fin-copper tube
	Pipe Diameter	mm	.275
	Rows-Fin Gap	in.	2 - .005
Coil length (l) x height (H) x coil width (L)			23.94 X 20 X 1.73
Fan Motor	Speed	rpm	900/650
	Output of Fan Motor	W	40
	RLA	A	0.17
	Capacitor	μF	/
Air Flow Volume of Outdoor Unit		CFM	1118
Fan	Type-Piece		Axial fan - 1
	Diameter	in.	15.7
Defrosting Method			/
Climate Type			T1
Isolation			I
Moisture Protection			IP24
Permissible Excessive Operating Pressure for the Discharge Side		PSI	552
Permissible Excessive Operating Pressure for the Suction Side		PSI	175
Sound Pressure Level		dB (A)	53
Sound Power Level		dB (A)	63
Dimension (W×H×D)		in.	33 3/8 X 23 1/2 X 12 1/2
Dimension of Package (L×W×H)		in.	34.6 X 14.2 X 22.3
Net Weight /Gross Weight		lbs	79.4/90.4
Refrigerant	Name of refrigerant		R410A
	Weight	lbs	2.65
Connection Pipe	Factory Prescharge		ft
	Gas additional charge		02/H
	Liquid Pipe Diameter		mm
	Gas Pipe Diameter		mm
Max. Interunit Height Difference		ft	33
Max. Interunit Piping Length		ft	66

The above data is subject to change without notice. Please refer to the nameplate of the unit.

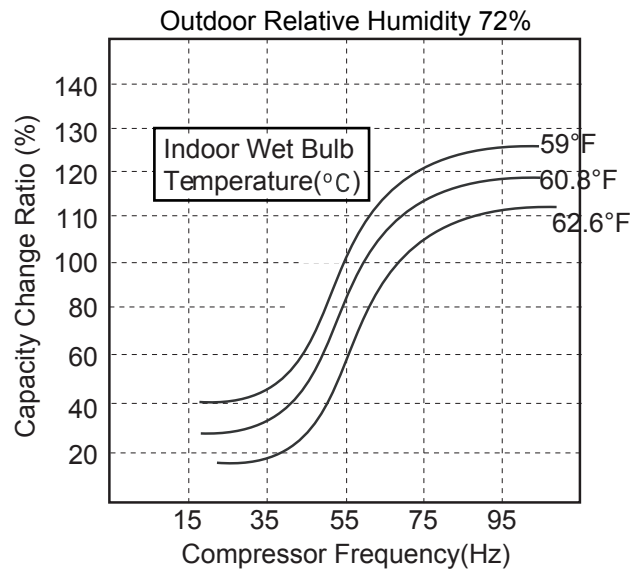
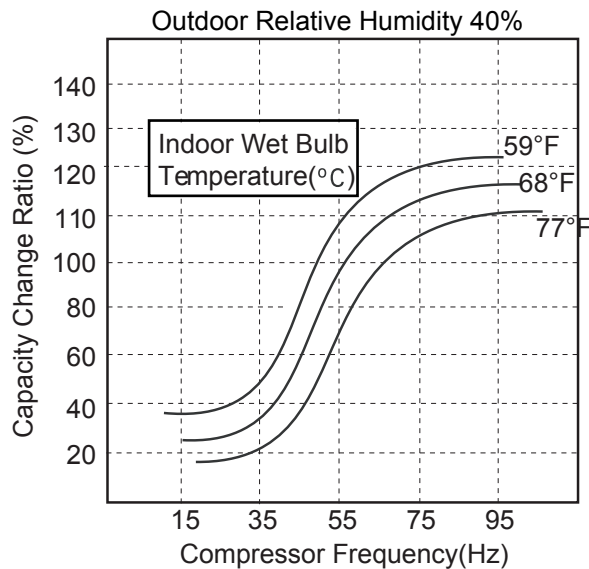
Specifications

Outdoor Unit		MR12C1H	
Compressor	Manufacturer/trademark		SANYO
	Model		C-6RZ110H1A
	Type		Twin rotory
	L.R.A (A)	A	33
	RLA(A)	A	4.59
	Power Input(W)	W	800
	Overload Protector		Int11I-3979
Throttling Method		Electronic Expansion Valve throttling	
Starting Method		Transducer starting	
Working Temp Range		F°	41 - 115
Heat Exchanger Coil	Coil		Aluminum fin-copper tube
	Pipe Diameter	mm	.275
	Rows-Fin Gap	in.	2 - .005
Coil length (l) x height (H) x coil width (L)		mm	747X508X44
Fan Motor	Speed	rpm	900/680
	Output of Fan Motor	W	40
	RLA	A	0.17
	Capacitor	μF	/
Air Flow Volume of Outdoor Unit		CFM	1118
Fan	Type-Piece		Axial fan
	Diameter	in.	15.7
Defrosting Method		/	
Climate Type		T1	
Isolation		I	
Moisture Protection		IP24	
Permissible Excessive Operating Pressure for the Discharge Side		PSI	552
Permissible Excessive Operating Pressure for the Suction Side		PSI	175
Sound Pressure Level		dB (A)	55
Sound Power Level		dB (A)	65
Dimension (W×H×D)		in.	33 3/8 X 23 1/2 X 12 1/2
Dimension of Package (L×W×H)		in.	34.6 X 14.2 X 22.3
Net Weight /Gross Weight		lbs	79.4/90.4
Refrigerant	Name of refrigerant		R410A
	Weight	lbs	2.65
Connection Pipe	Factory Prescharge	ft	25
	Gas additional charge	H	1/4 oz per ft
	Liquid Pipe Diameter	mm	Φ6(1/4")
	Gas Pipe Diameter	mm	Φ9(3/8")
Max. Interunit Height Difference		ft	33
Max. Interunit Piping Length		ft	66

The above data is subject to change without notice. Please refer to the nameplate of the unit.

Appending date

Table showing operation frequency limits for cooling and heating



Performance date for both cooling and heating

COOLING:

Temperature Condition (°F)		Model name	Standard pressure P (MPa)	Heat exchanger pipe temp.		Indoor fan mode	Outdoor fan mode	Compressor revolution (rps)
Indoor	Outdoor			EVP (°F)	OD(°F)			
80/67	95/-	09K	0.8 to 1.1	53 to 57	105 to 104	Turbo	High	Rated
		12K	0.8 to 1.0	50 to 54	109 to 113	Turbo	High	Rated

HEATING:

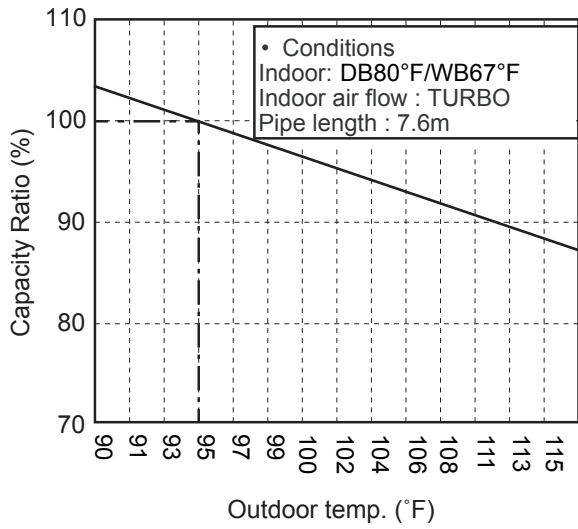
Temperature Condition (°F)		Model name	Standard pressure P (MPa)	Heat exchanger pipe temp.		Indoor fan mode	Outdoor fan mode	Compressor revolution (rps)
Indoor	Outdoor			EVP (°F)	COD(°C)			
67/60	47/43	09K	2.8 to 3.2	99 to 100	2 to 4	Turbo	High	Rated
		12K	2.8 to 3.2	108 to 111	0 to 3	Turbo	High	Rated

NOTES :

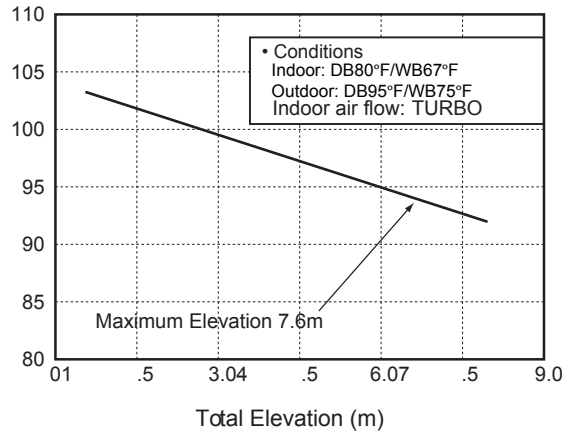
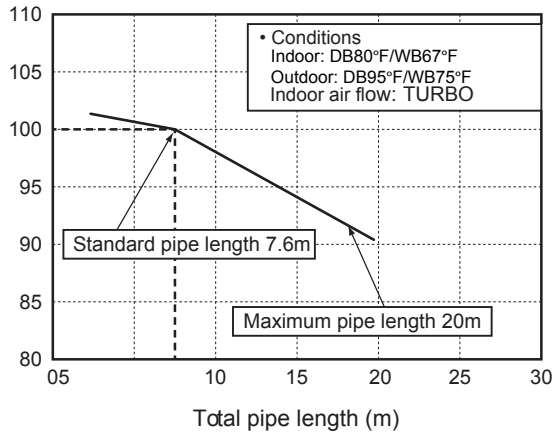
- (1) Measure surface temperature of heat exchanger pipe around center of heat exchanger path U bent. (Thermistor thermometer)
- (2) Connecting piping condition : 7.6 m

Expanded capacity data tables for both cooling and heating

Cooling



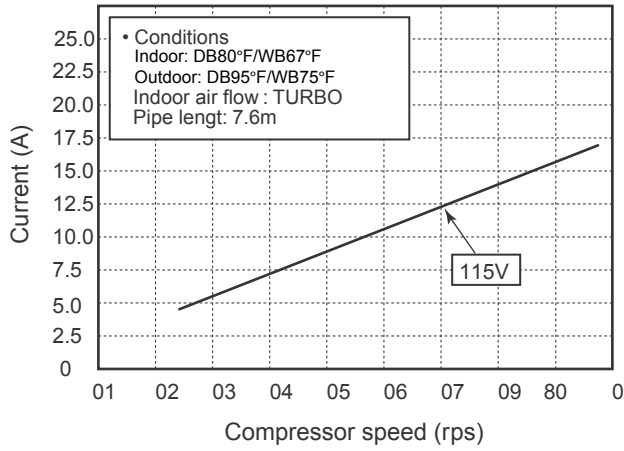
Capacity Variation Ratio According to Pipe Length



Operation Characteristic Curve

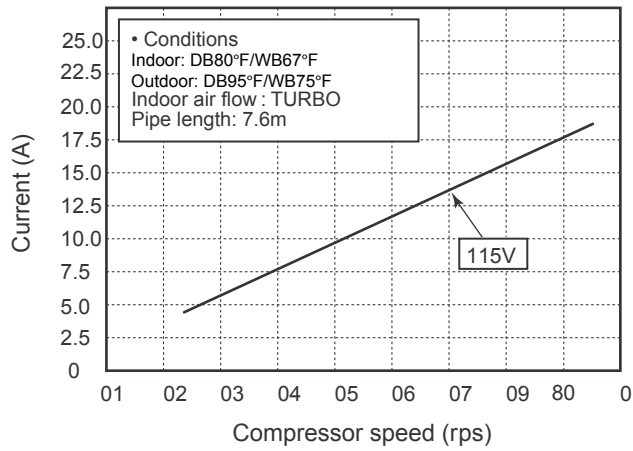
Cooling

9 btu unit



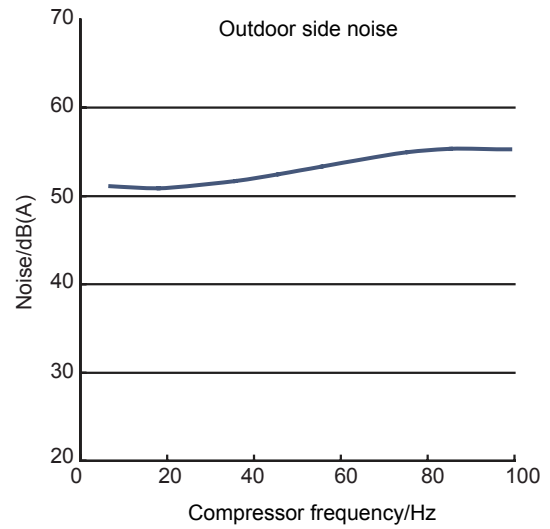
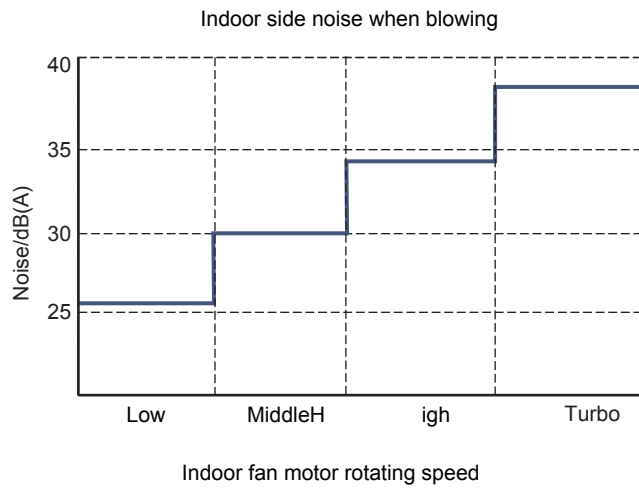
12 btu unit

Cooling

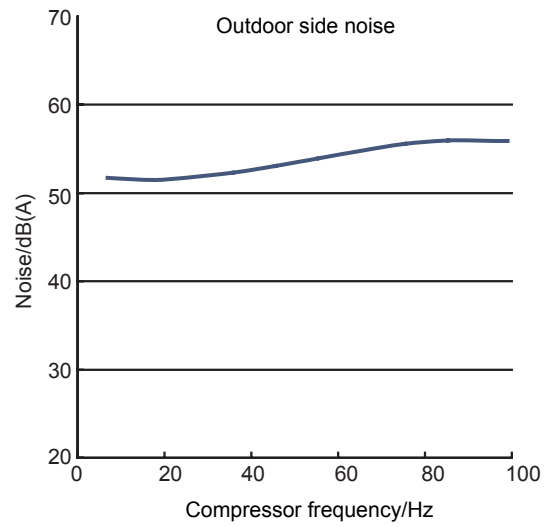
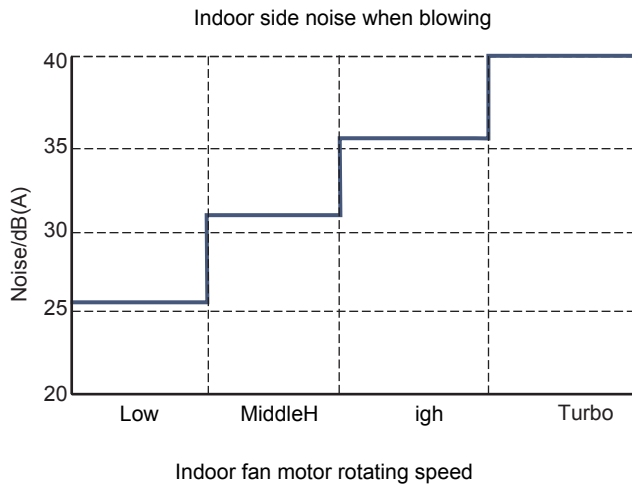


2.5 Noise criteria curve tables for both models

09 btu units

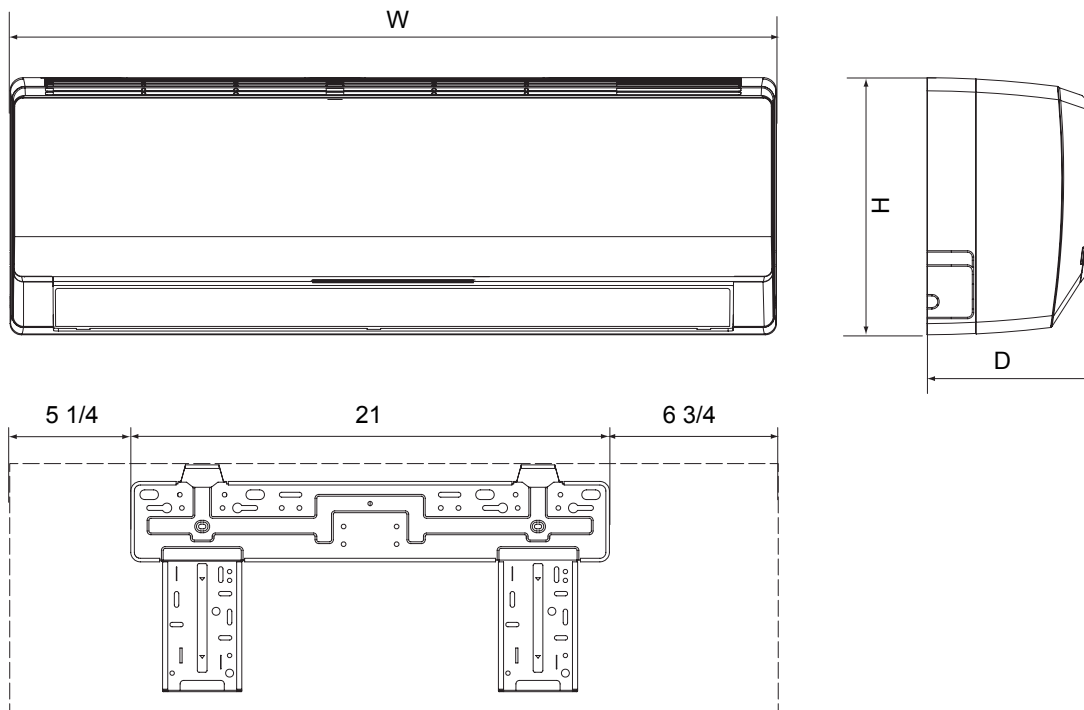


12 btu unit

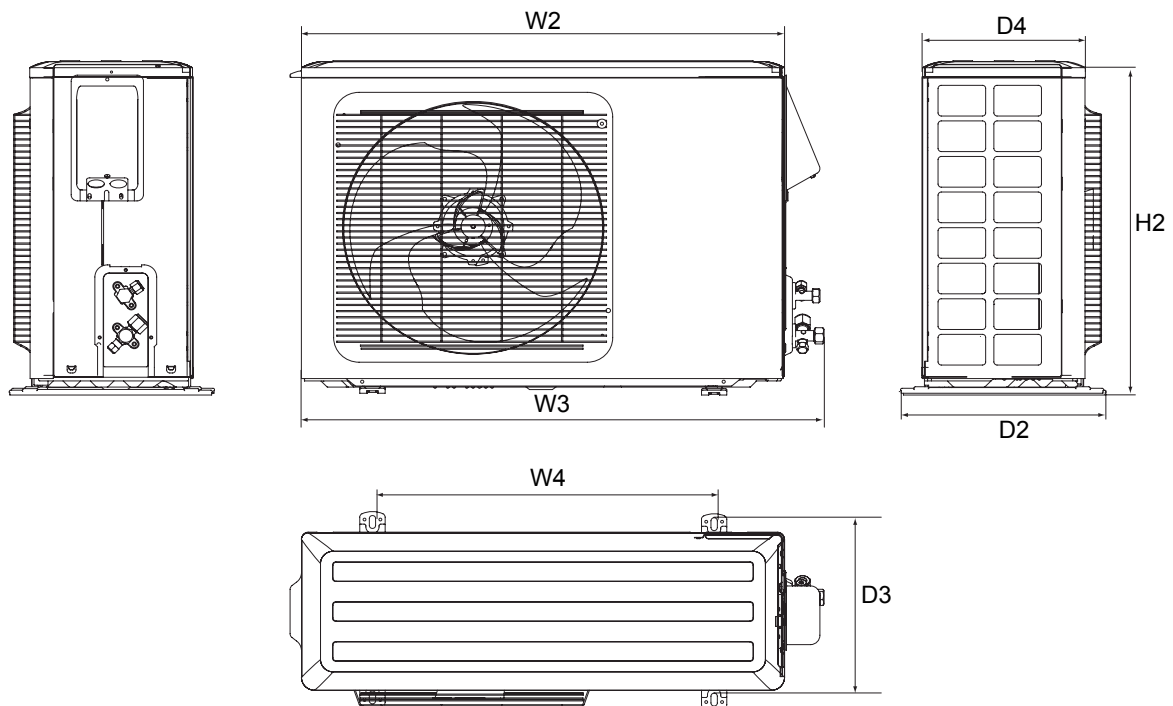


3. Construction Views

3.1 Indoor Unit



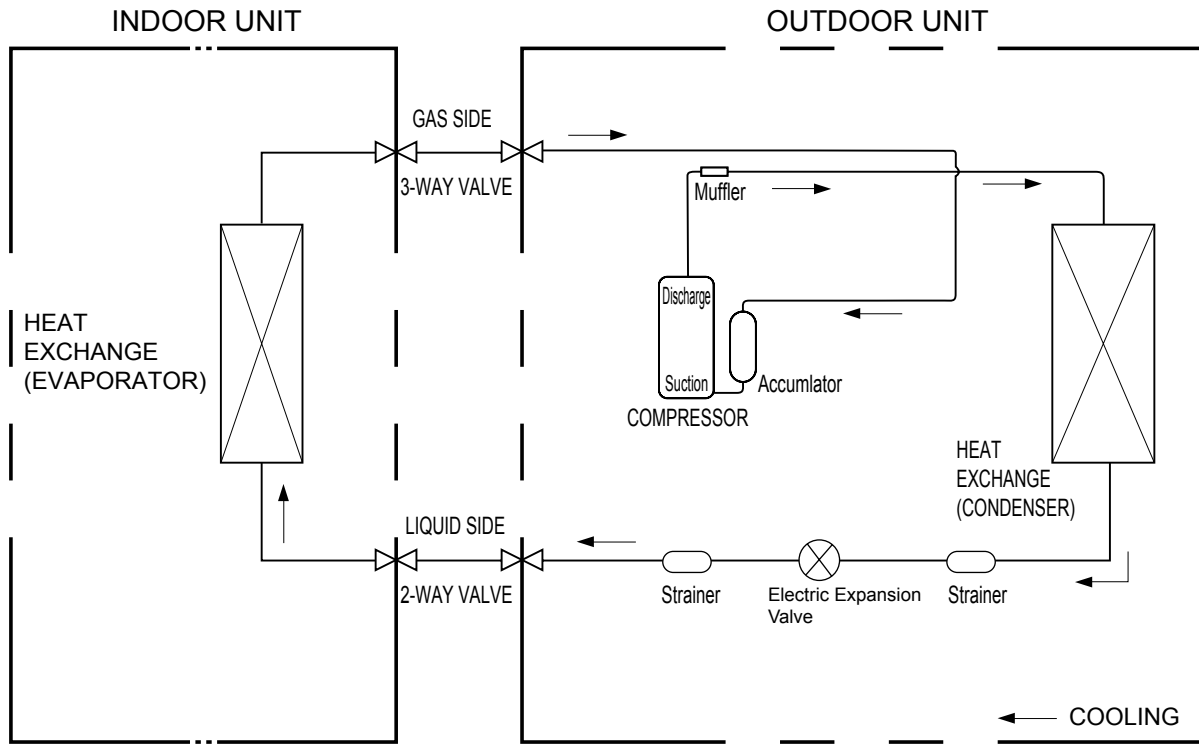
3.2 Outdoor Unit



System Model Number	Indoor Unit (mm)			Outdoor Unit (mm)						
	Cabinet			Cabinet			Additional Dimensions			
	W	H	D	W2	H2	D4	D2	W3	D3	W4
09K 12K	33 1/4	10 7/8	7 1/8	30 3/4	23 1/2	10 7/8	12 1/2	33 3/8	11	21 1/2

4. Refrigerant System Diagram

Cooling Models



5. Schematic Diagram

5.1 Electrical Date

Meaning of marks

● Indoor Unit

Symbol	Color symbol	Symbol	Color symbol
WH	WHITE	BN	BROWN
YE	YELLOW	BU	BLUE
RD	RED	BK	BLACK
YEGN	YELLOW GREEN	⊕	PROTECTIVE EARTH

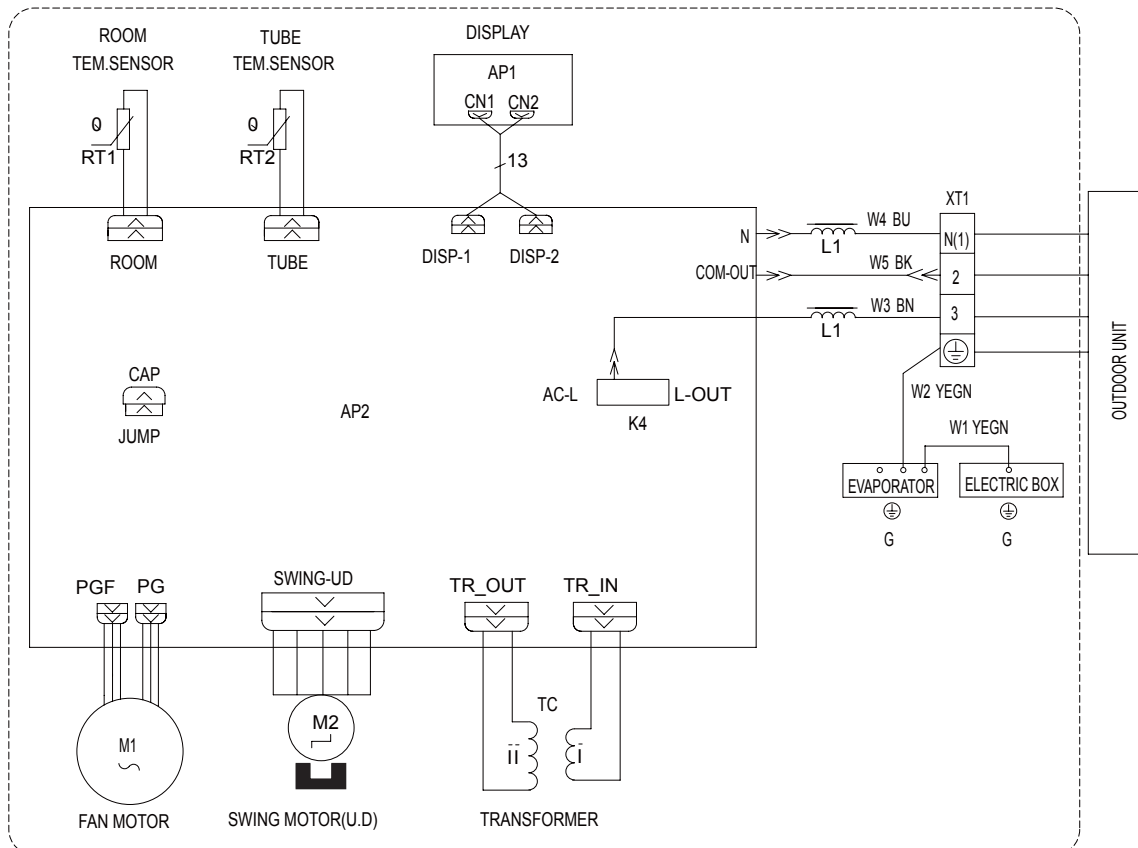
● Outdoor Unit

Symbol	Parts name	Symbol	Color symbol
L1	REACROR	WH	WHITE
PCB1~PCB2	PRINTED CIRCUIT BOARD	YE	YELLOW
S10/S11S40/S70/S80/S90	CONNECTOR	RD	RED
SAT	OVERLOAD	BN	SAT OVERLOAD BN BROWN
COMP	COMPRESSOR	BU	BLUE
⊕	PROTECTIVE EARTH	BK	BLACK
		YEGN	YELLOW GREEN

5.2 Electrical wiring

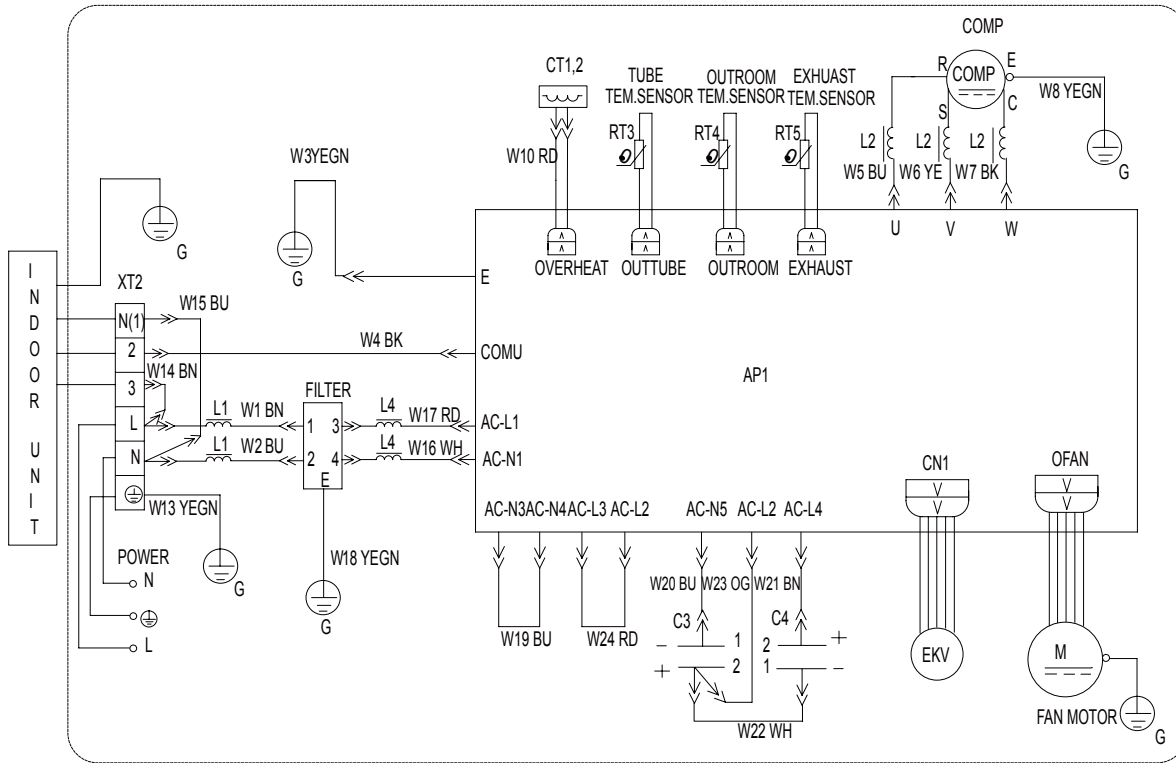
These circuit diagrams are subject to change without notice, please refer to the one supplied with the unit.

● Indoor Unit



● Outdoor Unit

Cooling Models of 115V

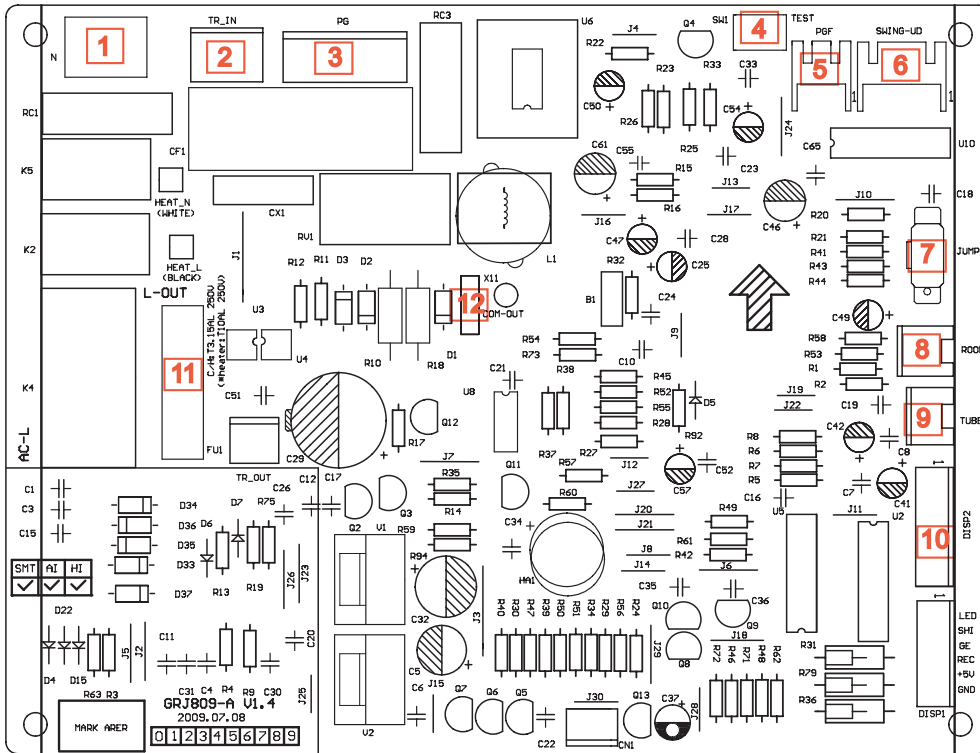


5.3 Printed Circuit Board

Indoor Unit

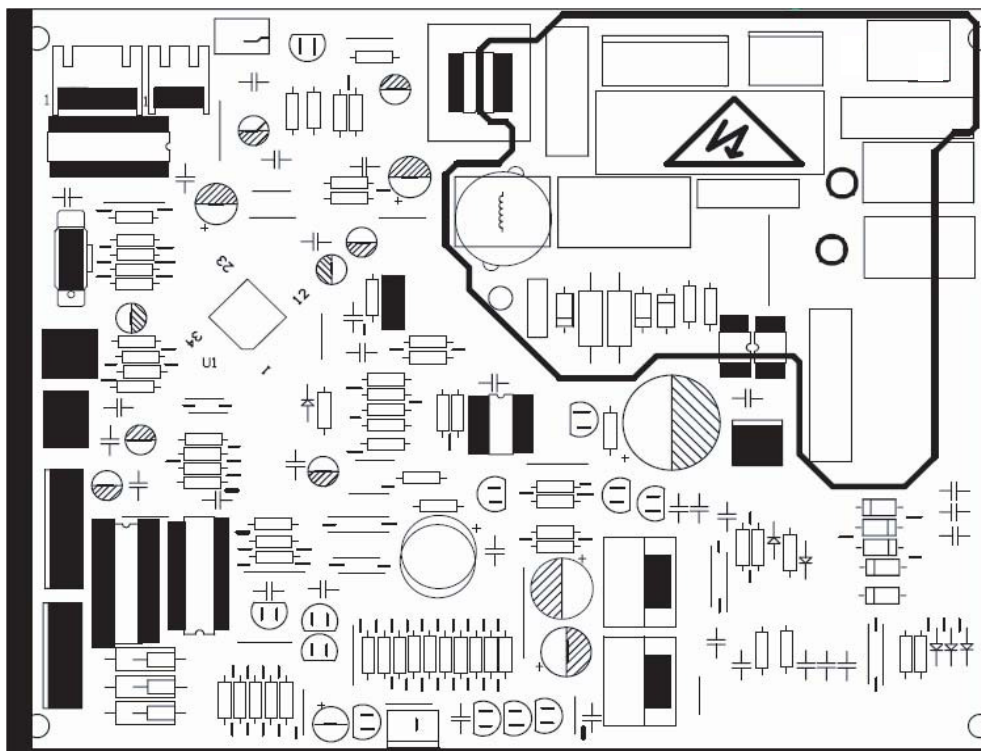
(1)Control PCB

● TOP VIEW



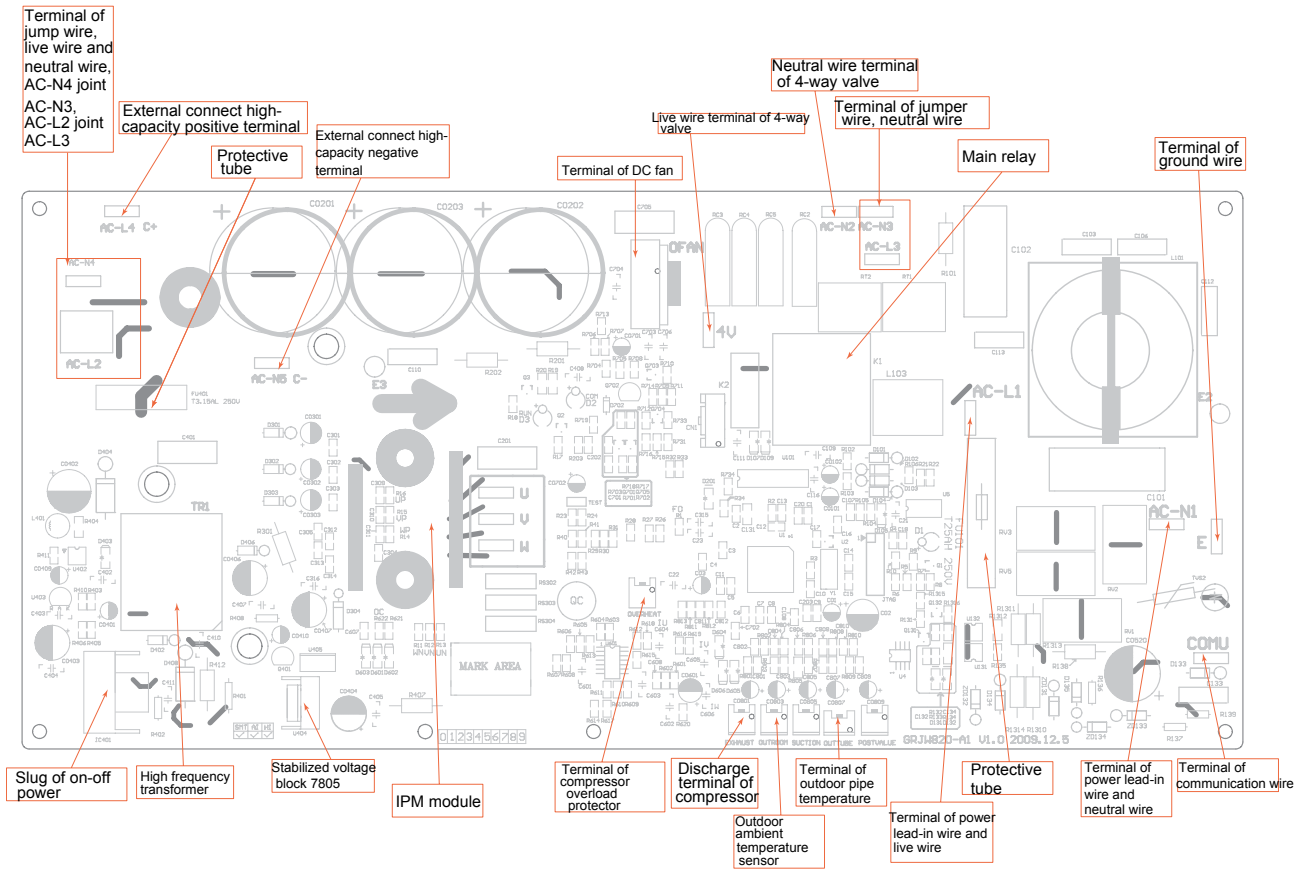
1	Interface of neutral wire
2	Transformer input
3	Interface of PG motor
4	Auto button
5	Feedback from PG motor
6	Up&Down swing
7	Jumper cap
8	Indoor temperature sensor
9	Pipe temperature sensor
10	DISP-1, DISP-2 display interface
11	Protective tube
12	Communication interface

● BOTTOM VIEW

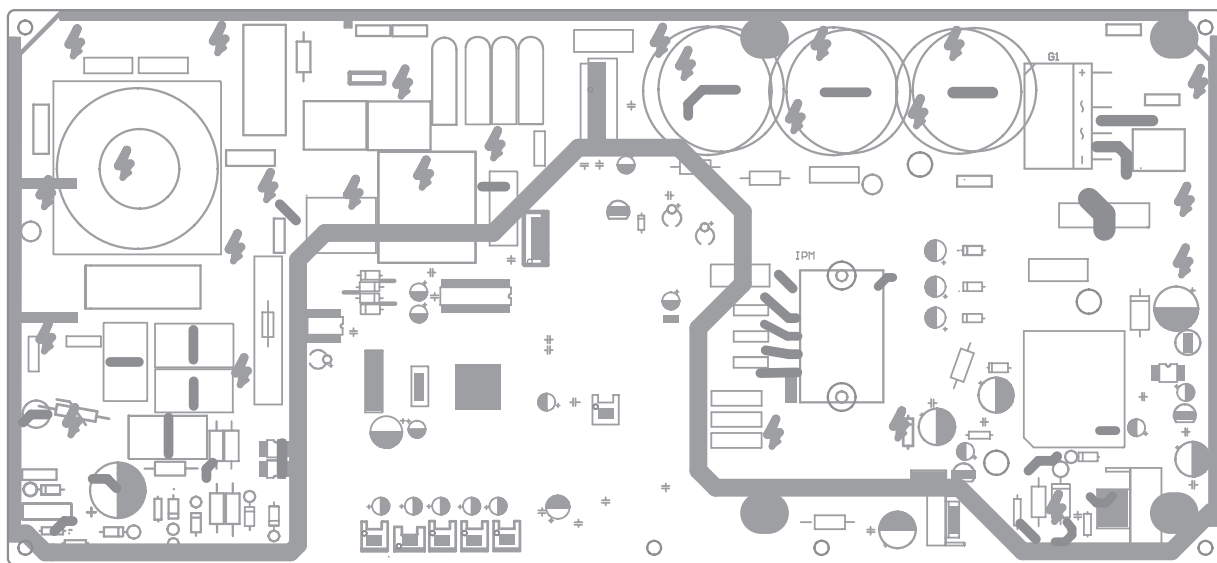


**Outdoor Unit
(1)115V Control PCB**

● **TOP VIEW**



● **BOTTOM VIEW**



6. Function and Control

6.1 Remote Control Operations



Note: Only name different between X-Fan and Blow, but the function is the same.

- 1 **START / STOP**
Press to start or stop operation.
- 2 **▼** : Press to decrease temperature setting.
- 3 **▲** : Press to increase temperature setting.
- 4 **FAN AUTO**
Press to set fan speed.
- 5 **MODE**
Press to select operation mode (AUTO/COOL/DRY/FAN/HEAT).
- 6 **SENSOR**
- 7 **CLOCK**
Press it set clock.
- 8 **TIMER ON**
Press it to set auto-on timer.
- 9 **AIR SWEEP**
Press it set swing angle.
- 10 **EXTEND**
- 11 **TEMP**
- 12 **TIMER OFF**
Press it to set auto-off timer
- 13 **TURBO**
- 14 **SLEEP**
- 15 **LIGHT**
Press it to turn on/off the light.

*Remote control works with cool and Heat Pump Models

1 ON/OFF :

Press this button to start the unit operation .Press this button again to stop the unit operation.

2 MODE :

Each time you press this button,a mode is selected in a sequence that goes from AUTO, COOL,DRY, FAN,and HEAT *, as the following:



*Note:Only for models with heating function.

After energization, AUTO mode is defaulted. In AUTO mode, the set temperature will not be displayed on the LCD, and the unit will automatically select the suitable operation mode in accordance with the room temperature to make indoor room comfortable.

3 + :

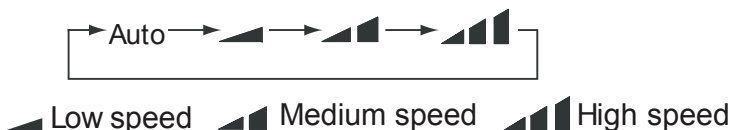
Press this button to increase set temperature.Holding down button above 2 seconds rapidly increases set temperature. In AUTO mode, set temperature is not adjustable.

4 -:

Press this button to decrease set temperature.Holding down button above 2 seconds rapidly decreases set temperature. In AUTO mode, set temperature is not adjustable.

5 FAN :





Every press of FAN button changes the fan speed in the following order:



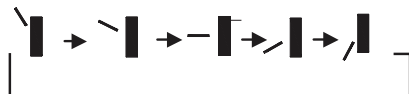
6  :

Every pressof the button changes the swing anglein the follow order:




This remote controller is universal . If any command  ,  or  is sent out, the unit will carry out the command as 

 indicates the guide louver swings as:





7 TIMER ON

Press TIMER ON button, "ON" blinks and  disappears. Within 5 seconds, every press of + or - button increases or decreases the ON time setting by 1 minutes. Holding down either buton above 2.5 seconds rapidly changes the time setting by 1 minute and then by 10 minutes. Within 5 seconds after setting, press TIMER ON to confirm. To cancel the TIMER ON operation, press TIMER ON button.


8 TIMER OFF :

Press TIMER OFF button to set TIMER OFF. The setting method is the same as TIMER ON.

9 CLOCK :




Press CLOCK button, the icon  blinks. During 5 seconds blinking, pressing + or - button adjusts preset time. Holding down either button above 2 seconds increases or decreases the time by 1 minute every 0.5 second. If you are still pressing the button after 10 minutes increased or decreased, the time will be changed by 10 minutes every 0.5 second. During blinking, press the CLOCK button again, the icon  will be constantly displayed and it indicates that setting has been finished.

10 X-FAN:

Pressing X-FAN button in COOL or DRY mode, the icon  is displayed and the indoor fan will continue operation for 10 minutes in order to dry the indoor unit even though you have turned off the unit.





After energization, X-FAN OFF is defaulted. X-FAN is not available in AUTO, FAN or HEAT mode.

11 TEMP:

Press TEMP button,  (set temperature),  (indoor ambient temperature) and  (outdoor ambient temperatur) is displayed circularly. Not displaying icon is defaulted.

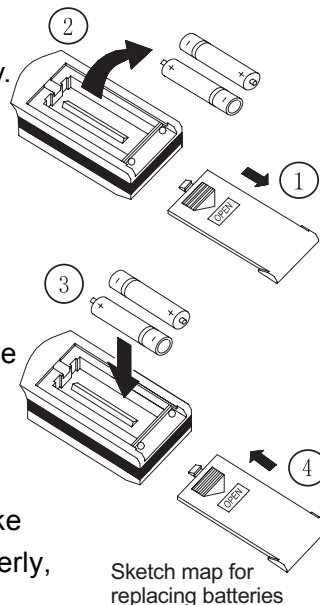
During operation of TEMP button, the set temperature is always displayed.

Note: Outdoor ambient temperature is only displayed for some models.

- 12** TURBO:
Press this button in COOL or HEAT mode turns on/off Turbo function. After TURBO function is set, its icon is displayed. When switching operation mode or changing fan speed, this function will be canceled automatically.
at super high fan speed. (This function is not applicable for some models).
- 13** SLEEP:
Press SLEEP button into SLEEP operation. Press SLEEP button again to cancel SLEEP. This function only can be used in COOL, HEAT (applicable to heat pump unit) or DRY mode, to maintain the most comfortable temperature for you.
- 14** LIGHT:
Press LIGHT button turns on/off the display's light. If the light is turned on,  is displayed. If the light is turned off  disappears.
- 3** and **4** About lock
Press "+" and "-" buttons simultaneously to lock or unlock the keypad. If the remote controller is locked,  is displayed. In this case, pressing any button,  blinks three times.
- 2** and **4** About switch between fahrenheit and cennigrade
At unit OFF, press "MODE" and "-" buttons simultaneously to switch between °C and °F .

Replacement of Batteries

1. Remove the battery cover plate from the rear of the remote controller.
(As shown in the figure)
2. Take out the old batteries.
3. Insert two new AAA1.5V dry batteries, and pay attention to the polarity.
4. Replace the battery cover plate.



★ Notes:

- When changing the batteries, do not use old or different batteries, otherwise, it may cause malfunction of the wireless remote control.
- If the wireless remote controller will not be used for a long time, please remove batteries to prevent damage from leaking batteries.
- The operation should be performed in its receiving range.
- It should be kept 1m away from the TV set or stereo sound sets.
- If the wireless remote controller does not operate normally, please take the batteries out and replace them after 30 s. If still not operating properly, replace the batteries.

Emergency Operation

When the wireless remote controller is lost or damaged, please use the manual switch on the main unit. Operation will be in AUTO mode and the temperature setting or fan speed can not be changed.

The manual switch can be operated as follow:

- To operate: Pressing the AUTO/STOP button, the unit enters into AUTO mode.

The microcomputer will monitor the room temperature to select the (COOL, HEAT, FAN) mode automatically, to obtain the comfortable effect.

- To turn off: Press the AUTO/STOP button to switch the unit off.

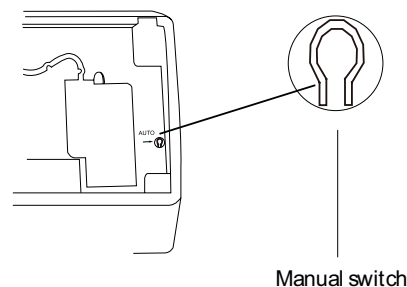


Fig.3

6.2 Description of Each Control Operation

1. Temperature Parameters

- ◆ Indoor preset temperature (T_{preset})
- ◆ Indoor ambient temperature (T_{amb})

2. Basic Functions

Once energized, in no case should the compressor be restarted within less than 3 minutes. In the situation that memory function is available, for the first energization, if the compressor is at stop before de-energization, the compressor will be started without a 3-minute lag; if the compressor is in operation before de-energization, the compressor will be started with a 3-minute lag; and once started, the compressor will not be stopped within 6 minutes regardless of changes in room temperature;

(1) Cooling Mode

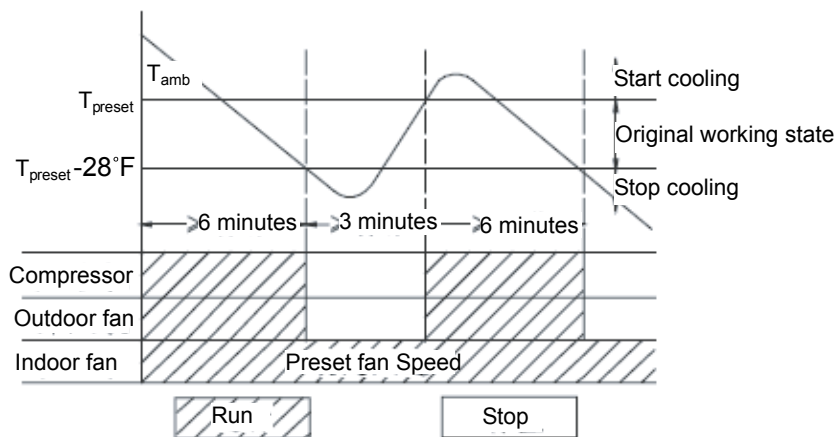
① Working conditions and process of cooling

When $T_{\text{amb}} \geq T_{\text{preset}}$ the unit will enter cooling operation, in which case the indoor fan, the outdoor fan and the compressor will work and the indoor fan will run at preset speed.

When $T_{\text{amb}} \leq T_{\text{preset}} - 28^\circ\text{F}$, the compressor will stop, the outdoor fan will stop with a time lag of 30s, and the indoor fan will run at preset speed.

When $T_{\text{preset}} - 28^\circ\text{F} < T_{\text{amb}} < T_{\text{preset}} + 34^\circ\text{F}$, the unit will remain at its previous state.

- Under this mode, the four-way valve will be de-energized and temperature can be set within a range from 61°F to 86°F . If the compressor is shut down for some reasons, the indoor fan and the swing device will operate at original state.



② Protection

◆ Antifreeze protection

Under cooling and dry mode, 6 minutes after the compressor is started:

If $T_{\text{evap}} \leq 36^\circ\text{F}$, the compressor will operate at reduced frequency.

If $T_{\text{evap}} \leq -30^\circ\text{F}$ is detected for durative 3 minutes, the compressor will stop, and after 30 seconds, the outdoor fan will stop; and under cooling mode, the indoor fan and the swing motor will remain at the original state.

If $T_{\text{evap}} \geq 42^\circ\text{F}$ and the compressor has remained at OFF for at least 3 minutes, the compressor will resume its original operation state.

◆ Total current up and frequency down protection

If $I_{\text{total}} \leq A$, frequency rise will be allowed; if $I_{\text{total}} \geq B$, frequency rise will not be allowed; if $I_{\text{total}} \geq C$, the compressor will run at reduced frequency; and if $I_{\text{total}} \geq D$, the compressor will stop and the outdoor fan will stop with a time lag of 30s.

(2) Dry Mode

① Working conditions and process of dry

If $T_{\text{amb}} > T_{\text{preset}}$ the unit will enter cooling and dry mode, in which case the compressor and the outdoor fan will operate and the indoor fan will run at low speed.

If $T_{\text{preset}} - 28^\circ\text{F} \leq T_{\text{amb}} \leq T_{\text{preset}}$ the compressor remains at its original operation state.

If $T_{\text{amb}} < T_{\text{preset}} - 28^\circ\text{F}$, the compressor will stop, the outdoor fan will stop with a time lag of 30s, and the indoor fan will operate at low speed.

② Protection

Protection is the same as that under the cooling mode.

(3) Heating Mode

① Working conditions and process of heating

If $T_{amb} \leq T_{preset} + 36^{\circ}\text{F}$, the unit enters heating mode, in which case the four-way valve, the compressor and the outdoor fan will operate simultaneously, and the indoor fan will run at preset speed in the condition of preset cold air prevention.

If $T_{amb} \geq T_{preset} + 41^{\circ}\text{F}$, the compressor will stop, the outdoor fan will stop with a time lag of 30s, and the indoor fan will stop after 60-second blow at low speed

If $T_{preset} + 36^{\circ}\text{F} < T_{amb} < T_{preset} + 41^{\circ}\text{F}$, the unit will maintain its original operating status.

➤ Under this mode, the four-way valve is energized and temperature can be set within a range of 61 - 86°F. The operating symbol, the heating symbol and preset temperature are revealed on the display.

② Condition and process of defrost

When duration of successive heating operation is more than 45 minutes, or accumulated heating time more than 90 minutes, and one of the following conditions is reached, the unit will enter the defrost mode after 3 minutes.

- a. $T_{outdoor\ amb} \geq A^{\circ}\text{F}$, $T_{outdoor\ tube} \leq W^{\circ}\text{F}$;
- b. $A^{\circ}\text{F} \leq T_{outdoor\ amb} < B^{\circ}\text{F}$, $T_{outdoor\ tube} \leq X^{\circ}\text{F}$;
- c. $B^{\circ}\text{F} \leq T_{outdoor\ amb} < C^{\circ}\text{F}$, $T_{outdoor\ tube} \leq Y^{\circ}\text{F}$;
- d. $T_{outer\ amb} < C^{\circ}\text{F}$, $T_{outer\ tube} \leq Z^{\circ}\text{F}$

At that time, the indoor fan stops and the compressor stops, and after 30 seconds the outdoor fan will stop, and then after 30 seconds, the four-way valve will stop. After 30 seconds, the compressor is initiated for raising the frequency to defrost frequency.

When the compressor has operated under defrost mode for 7.5 minutes, or $T_{outer\ tube} \geq E^{\circ}\text{F}$, the compressor will be converted to 53Hz operation. After 30 seconds, the compressor will stop. And after another 30 seconds, the four-way valve will be opened, and after 60 seconds, the compressor and the outdoor fan will be started, the indoor fan will run under preset cold air prevention conditions, and H1 will be displayed at temperature display area on the display panel. Defrost frequency is 70Hz.

3. Protection

◆ Cold air prevention

The unit is started under heating mode (the compressor is ON):

① In the case of $T_{indoor\ amb} < 75^{\circ}\text{F}$: if $T_{tube} \leq 104^{\circ}\text{F}$ and the indoor fan is at stop state, the indoor fan will begin to run at low speed with a time lag of 2 minutes. Within 2 minutes, if $T_{tube} > 40^{\circ}\text{C}$, the indoor fan also will run at low speed; and after 1-minute operation at low speed, the indoor fan will be converted to operation at preset speed. Within 1-minute low speed operation or 2-minute non-operation, if $T_{tube} > 108^{\circ}\text{F}$, the fan will run at present speed.

② In the case of $T_{indoor\ amb} \geq 75^{\circ}\text{F}$: if $T_{tube} \leq 108^{\circ}\text{F}$, the indoor fan will run at low speed, and after one minute, the indoor fan will be converted to preset speed. With in one-minute low speed operation, if $T_{tube} > 108^{\circ}\text{F}$, the indoor fan will be converted to preset speed.

Note: $T_{indoor\ amb}$ indicated in ① and ② refers to, under initially heating mode, the indoor ambient temperature before the command to start the compressor is performed according to the program, or after the unit is withdrawn from defrost, the indoor ambient temperature before the defrost symbol is cleared.

◆ Total current up and frequency down protection

If the total current $I_{total} \leq W$, frequency rise will be allowed; if $I_{total} \geq X$, frequency rise will not be allowed; if $I_{total} \geq Y$, the compressor will run at reduced frequency; and if $I_{total} \geq Z$, the compressor will stop and the outdoor fan will stop with a time lag of 30s.

(4) Fan Mode

Under the mode, the indoor fan will run at preset speed and the compressor, the outdoor fan, the four-way valve and the electric heater will stop.

➤ Under the mode, temperature can be set within a range of 61°F - 86°F.

(5) AUTO Mode

① Working conditions and process of AUTO mode

Under AUTO mode, standard cooling temperature T_{preset} is 77°F and standard heating temperature T_{preset} is 64.4°F.

- a. Once energized, if $T_{amb} \leq 68^{\circ}\text{F}$, the unit will be started under heating mode; if $68^{\circ}\text{F} < T_{amb} < 77^{\circ}\text{F}$, the unit will run under fan mode and the operation indicator lamp will be bright; and if $T_{amb} \geq 77^{\circ}\text{F}$, the unit will be started under cooling mode.

- a. Under AUTO mode, if $T_{amb} \geq T_{preset}$ is detected, the unit will select to run under cooling mode, in which case implicit preset temperature is 77°F; if $T_{amb} \leq T_{preset} - 28^\circ\text{F}$, the compressor will stop, the outdoor fan will stop with a time lag of 1 minute, and the indoor fan will run at preset speed; and if $T_{preset} - (28^\circ\text{F}) < T_{amb} < T_{preset}$, the unit will remain at its original state.
- b. Under AUTO mode, if $T_{amb} \leq T_{preset} + 36^\circ\text{F}$ is detected, the unit will select to run under heating mode, in which case implicit preset temperature is 64°F; if $T_{amb} \geq T_{preset} + 41^\circ\text{F}$, the compressor will stop, the outdoor fan will stop with a time lag of 1 minute, and the indoor fan will run under the mode of residue heat blowing; and if $T_{preset} + 36^\circ\text{F} < T_{amb} < T_{preset} + 41^\circ\text{F}$, the unit will remain at its original state. The cooling-only unit will run under fan mode.
- c. Under AUTO mode, if $68^\circ\text{F} < T_{amb} < 77^\circ\text{F}$, the unit will remain at its original state.

2. Protection

- a. In cooling operation, protection is the same as that under the cooling mode;
- b. In heating operation, protection is the same as that under the heating mode;
- c. When ambient temperature changes, operation mode will be converted preferentially. Once started, the compressor will remain unchanged for at least 6 minutes.

(6) Common Protection Functions and Fault Display under COOL, HEAT, DRY and AUTO Modes

① Overload protection

T_{tube} : measured temperature of outdoor heat exchanger under cooling mode; and measured temperature of indoor heat exchanger under heating mode.

1) Cooling overload

- a. If $T_{tube} \leq 106^\circ\text{F}$, the unit will return to its original operation state.
- b. If $T_{tube} \geq 131^\circ\text{F}$, frequency rise is not allowed.
- c. If $T_{tube} \geq 136^\circ\text{F}$, the compressor will run at reduced frequency.
- d. If $T_{tube} \geq 144^\circ\text{F}$, the compressor will stop and the indoor fan will run at preset speed.

2) Heating overload

- a. If $T_{tube} \leq 106^\circ\text{F}$, the unit will return to its original operation state.
- b. If $T_{tube} \geq 131^\circ\text{F}$, frequency rise is not allowed.
- c. If $T_{tube} \geq 136^\circ\text{F}$, the compressor will run at reduced frequency.
- d. If $T_{tube} \geq 144^\circ\text{F}$, the compressor will stop and the indoor fan will blow residue heat and then stop.

② Exhaust temperature protection of compressor

If exhaust temperature $\geq 208^\circ\text{F}$, frequency is not allowed to rise.

If exhaust temperature $\geq 217^\circ\text{F}$, the compressor will run at reduced frequency.

If exhaust temperature $\geq 230^\circ\text{F}$, the compressor will stop.

If exhaust temperature $\leq 194^\circ\text{F}$ and the compressor has stayed at stop for at least 3 minutes, the compressor will resume its operation.

Communication fault

If the unit fails to receive correct signals for durative 3 minutes, communication fault can be justified and the whole system will stop.

Module protection

Under module protection mode, the compressor will stop. When the compressor remains at stop for at least 3 minutes, the compressor will resume its operation. If module protection occurs six times in succession, the compressor will not be started again.

Overload protection

If temperature sensed by the overload sensor is over 239°F, the compressor will stop and the outdoor fan will stop with a time lag of 30 seconds. If temperature is below 203°F, the overload protection will be relieved.

If voltage on the DC bus is below 150V or over 420V, the compressor will stop and the outdoor fan will stop with a time lag of 30 seconds. When voltage on the DC bus returns to its normal value and the compressor has stayed at stop for at least 3 minutes, the compressor will resume its operation.

Faults of temperature sensors

Designation of sensors	Faults
Indoor ambient temperature	The sensor is detected to be open-circuited or short-circuited for successive 30 seconds
Indoor tube temperature	The sensor is detected to be open-circuited or short-circuited for successive 30 seconds
Outdoor ambient temperature	The sensor is detected to be open-circuited or short-circuited for successive 30 seconds
Outdoor tube temperature	The sensor is detected to be open-circuited or short-circuited for successive 30 seconds, and no detection is performed within 10 minutes after defrost begins.
Exhaust	After the compressor has operated for 3 minutes, the sensor is detected to be open-circuited or short-circuited for successive 30 seconds.
Overload	After the compressor has operated for 3 minutes, the sensor is detected to be open-circuited or short-circuited for successive 30 seconds.

3. Other Controls

(1) ON/OFF

Press the remote button ON/OFF: the on-off state will be changed once each time you press the button.

(2) Mode Selection:

Press the remote button MODE, then select and show in the following ways: AUTO, COOL, DRY, FAN, HEAT, AUTO.

(3) Temperature Setting Option Button

Each time you press the remote button TEMP+ or TEMP-, the setting temperature will be up or down by 34°F. Regulating Range: 61°F~86°F, the button is useless under the AUTO mode.

(4) Time Switch

You should start and stop the machine according to the setting time by remote controller.

(5) SLEEP State Control

a. When the air conditioner is under the mode of COOL, DRY, and the SLEEP mode has been set well, after the SLEEP state keeps about 1 hour, the pre-setting T will raise 34°F, and it will raise 34°F again after 2 hours, so it raise 36°F in 2 hours, then it will run on at the setting temperature and fan speed.

b. When the air conditioner is under the mode of HEAT, and the Timer has been set well, after the SLEEP state keeps about 1 hour, the pre-setting T will reduce 34°F, and it will reduce 34°F again after 2 hours, so it reduce 36°F in 2 hours, then it will run on at the setting temperature and wind speed.

c. The setting temperature keeps the same under the FAN mode and AUTO mode.

(6) Indoor Fan Control

The Indoor Fan can be set as HIGH, MED, LOW by remote controller, and the Indoor Fan will be respectively run at high, medium, low speed. It will also be set as AUTO, and the Indoor Fan is as the following at the automatic fan speed.

Cooling mode: $T_{ring} \geq T_{setting} + 2$, high speed; $T_{setting} - 2 < T_{ring} < T_{setting} + 2$, medium speed; $T_{ring} \leq T_{setting} - 2$, low speed.

Sending fan mode: $T_{ring} > T_{setting} + 4$, high speed; $T_{setting} + 2 \leq T_{ring} \leq T_{setting} + 4$, medium speed; $T_{ring} < T_{setting} + 2$, low speed.

Moisture removal mode: force to be set as the low speed

Heating mode: $T_{ring} \leq T_{setting} + 1$ high speed; $T_{setting} + 1 < T_{ring} < T_{setting} + 5$, medium speed; $T_{ring} \geq T_{setting} + 2$, low speed.

(7) Buzzer Control

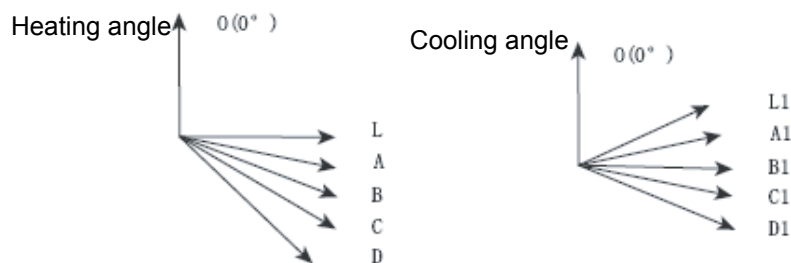
The buzzer will send a "Di" sound when the air conditioner is powered up or received the information sent by the remote control or there is a button input, the single tube cooler doesn't receive the remote control ON signal under the mode of heating mode.

(8) Auto button

If the controller is on, it will stop by pressing the button, and if the controller is off, it will be automatic running state by pressing the button, swing on and light on, and the main unit will run based on the remote control if there is remote control order.

(9) Up-and-Down Swinging Control

When power on, the up-and-down motor will firstly move the air deflector to 0 counter-clockwise, close the air outlet. After starting the machine, if you don't set the swinging function, heating mode and auto-heating mode, the up-and-down air deflector will move to D clockwise; under other modes, the up-and-down air deflector will move to L1. If you set the swing function when you start the machine, then the wind blade will swing between L and D. The air deflector has 7 swing states: Location L, Location A, Location B, Location C, Location D, Location L to Location D, stop at any location between L-D (the included angle between L~D is the same). The air deflector will be closed at 0 location, and the swing is effectual only on condition that setting the swing order and the inner fan is running. The indoor fan and compressor may get the power when air deflector is on the default location.



(10) Display

① Operation pattern and mode pattern display

All the display patterns will display for a time when the unit is powered on, the operation indication icon will display in red under standby status. When the machine is start by remote controller, the indication icon will light and display the current operation mode (the mode light includes: Cooling, heating and dry). If you close the light key, all the display icons will close.

② Double-8 display

According to the different setting of remote control, the nixie lamp may display the current temperature (the temperature scope is from 61°F to 86°F) and indoor ambient temperature. The heating and air supply temperature will display 77°F under auto-mode, the temperature will display 64°F under the heating mode, and the temperature will display H1 under the defrosting mode.(If you set the fahrenheit temperature display, the nixie lamp will display according to fahrenheit temperature)

(11) Protection function and failure display

E2: Freeze-proofing protection E4: Exhausting protection E5: Overcurrent protection

E6: Communication failure E8: Overload protection

F1: Indoor ambient sensor start and short circuit (continuously measured failure in 30S)

F2: Indoor evaporator sensor start and shortcircuit (continuously measured failure in 30S)

F3: Outdoor ambient sensor start and short circuit (continuously measured failure in 30S)

F2: Outdoor condenser sensor start and short circuit (continuously measured failure in 30S, and don't measure within 10 minutes after defrosted)

F5: Outdoor exhausting sensor start and short circuit (continuously measured failure in 30S after the compressor operated 3 minutes)

H3: Overload protection of compressor H5: Module protection

PH: High-voltage protection PL: Low-voltage protection

P1: Nominal cooling and heating P2: Maximum cooling and heating

P3: Medium cooling and heating P0: Minimum cooling and heating

(12) Drying Function

You may start or stop the dry function under the modes of cooling and dry at the starting status (The modes of automatism, heating and air supply do not have dry function). When you start the dry function, after stop the machine by pressing the switch button, you should keep running the infor fans for 10 minutes under low air damper (The swing will operate as the former status within 10 minutes, and other load is stopped), then stop the entire machine; When you stop the dry function, press the switch button will stop the machine directly.

When you start the drying function, operating the drying button will stop the inner fans and close the guide louver.

(13) Memory function when interrupting the power supply

Memory content: mode, swing function, light, set temperature and wind speed.

After interrupted the power supply, the machine will start when recovering the power according to the memory content automatically. If the last remote control command has not set the timed function, the system will remember the last remote control command and operate according it. If the last remote control command has set timed function and the power supply is interrupted before the timed time, the system will remember the timed function of the last remote control command, the timed time will recounted form power on. If the last remote control command has set timed function, the time is out and the system is start or stop according to the set time when the power supply is interrupted, the system will remember the operation status before the power supply was interrupted, and do not carry out timed action; The timed clock will not be remembered.

6.3 Detection of temperature sensor malfunction

(1) Indoor temperature sensor

Detect malfunctions of temperature sensor any time.

(2) Indoor pipe temperature sensor

In defrosting period, the temperature sensor malfunction will not be detected. 5 min after finishing defrosting, the system begins to detect the temperature sensor malfunction. In other times, the temperature sensor malfunction will be detected.

(3) Protection of temperature sensor

1. When short-circuit occurs to the temperature sensor for 30s:

The temperature sensor overheats. In this case, the complete unit will stop for protection. At the same time, the temperature protection and temperature sensor malfunction will be shown.

2. When break-circuit occurs to the temperature sensor for 30s:

The unit will stop and the temperature sensor malfunction will be displayed

6.4 Frequency Control

Frequency Initial Setting

<Outline>

When starting the compressor, or when conditions are varied due to the change of the room, the frequency must be initialized according to the ΔD value of the indoor unit and the Q value of the indoor unit.

Q value: Indoor unit output determined from indoor unit volume, air flow rate and other factors.

PI Control (Determine Frequency Up / Down by ΔD Signal)

1. Pcontrol

Calculate ΔD value in each sampling time (20 seconds), and adjust the frequency according to its difference from the frequency previously calculated.

2. Icontrol

If the operating frequency is not change more than a certain fixed time, adjust the frequency up and down according to the ΔD value, obtaining the fixed ΔD value.

When the ΔD value is small...lower the frequency.

When the ΔD value is large...increase the frequency.

3. Frequency management when other controls are functioning

When frequency is drooping;

Frequency management is carried out only when the frequency droops.

For limiting lower limit

Frequency management is carried out only when the frequency rises.

4. Upper and lower limit of frequency by PI control

The frequency upper and lower limits are set depending on indoor unit.

When low noise commands come from the indoor unit or when outdoor unit low noise or quiet commands come from indoor unit, the upper limit frequency must be lowered than the usual setting.

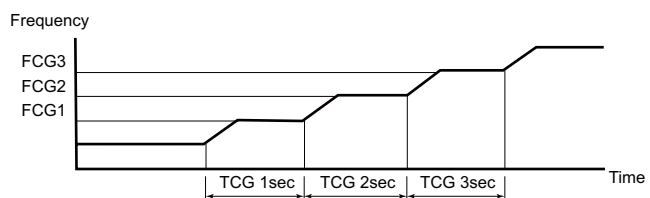
6.5 3-minutes Standby

Prohibit to turn ON the compressor for 3 minutes after turning it off.(except when defrosting)

6.6 Compressor Protection Function

When turning the compressor from OFF to ON, the upper limit of frequency must be set as follows. (The function must not be used when defrosting.)

FCG 3	88
FCG 2	64
FCG 1	48
TCG1	240
TCG2	360
TCG3	180



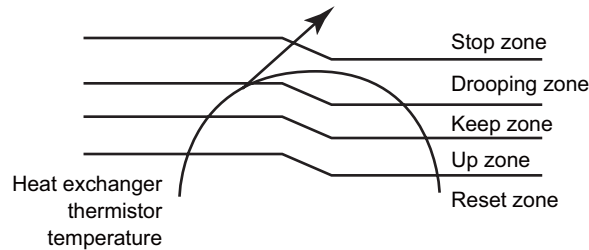
6.7 Discharge Pipe Control

Outline

The discharge pipe temperature is used as the compressor's internal temperature. If the discharge pipe temperature rises above a certain level, the operating frequency upper limit is set to keep this temperature from going up further.

Detail

Divide the Zone



Management within the Zones

Zone	Control contents
Stop zone	When the temperature reaches the stop zone, stop the compressor and correct abnormality.
Drooping zone	Start the timer, and the frequency will be drooping.
Keep zone	Keep the upper limit of frequency.
Return / Reset zone	Cancel the upper limit of frequency.

6.8 Input Current Control

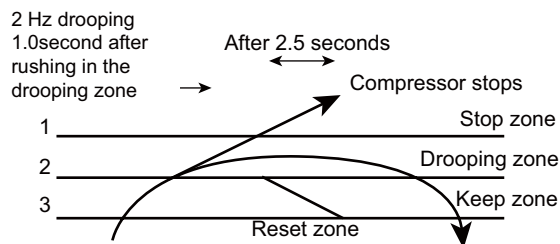
Outline

Detect an input current by the CT during the compressor is running, and set the frequency upper limit from such input current.

In case of heat pump model, this control is the upper limit control function of the frequency which takes priority of the lower limit of four way valve activating compensation.

Detail

The frequency control will be made within the following zones.



When a "stop current" continues for 2.5 seconds after rushing on the stop zone, the compressor operation stops.

If a "drooping current" is continues for 1.0 second after rushing on the drooping zone, the frequency will be 2 Hz drooping.

Repeating the above drooping continues until the current rushes on the drooping zone without change.

In the keep zone, the frequency limit will remain.

In the return / reset zone, the frequency limit will be cancelled.

Limitation of current drooping and stop value according to the outdoor air temperature

1. In case the operation mode is cooling

* The current droops when outdoor air temperature becomes higher than a certain level (model by model).

2. In case the operation mode is heating

* The current droops when outdoor air temperature becomes higher than a certain level (model by model).

6.9 Freeze-up Protection Control

Outline

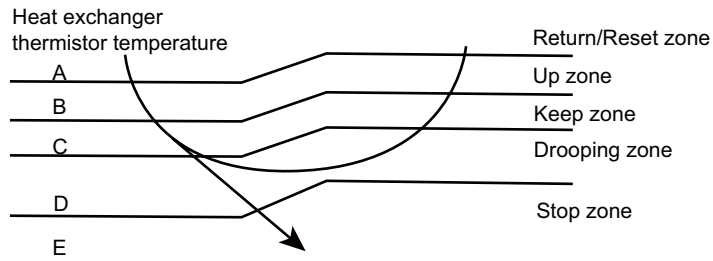
During cooling operation, the signals being sent from the indoor unit allow the operating frequency limitation and then prevent freezing of the indoor heat exchanger. (The signal from the indoor unit must be divided into the zones as the followings.)

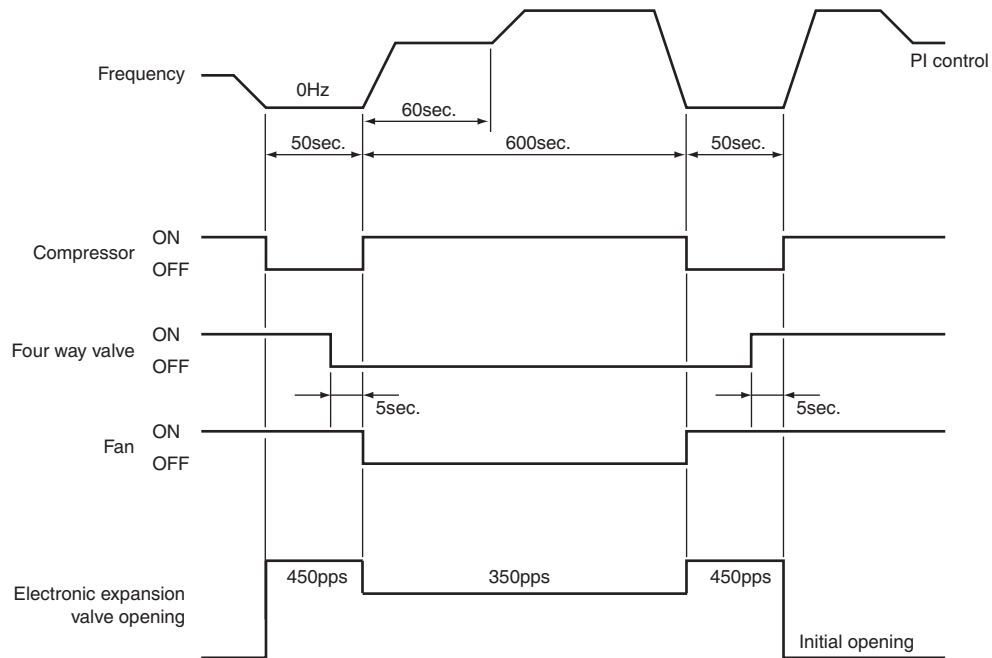
Detail

Conditions for Start Controlling

Judge the controlling start with the indoor heat exchanger temperature after 2 sec from operation start.

Control in Each Zone





6.12 Fan Control

Outline

Fan control is carried out according to the following priority.

1. Fan ON control for electric component cooling fan
2. Fan control when defrosting
3. Fan OFF delay when stopped
4. ON/OFF control in cooling operation
5. Tap control when drooping function is working
6. Fan control in forced operation
7. Fan control in indoor/outdoor unit silent operation
8. Fan control in powerful mode
9. Fan control in normal operation

Detail

Fan OFF Control when Stopped

* Fan OFF delay for 60 seconds must be made when the compressor is stopped.

Tap Control in indoor/outdoor unit silent operation

1. When Cooling Operation

When the outdoor air temperature is lower than 99°F, the fan tap must be set to L.

2. When Heating Operation

When the outdoor air temperature is higher than 39°F, the fan tap must be turned to L (only for heat pump model).

7. Installation Manual

7.1 Notices for installation



Important Notices

1. The unit installation work must be done by qualified personnel according to the local rules and this manual.
2. Before installing, please contact with local authorized maintenance center, if unit is not installed by the authorized maintenance center, the malfunction may not solved, due to discommodious contacts.
3. When removing the unit to the other place, please firstly contact with the authorized Maintenance Center in the local area.
4. The appliance must be positioned so that the plug is accessible
5. After pull out the power plug then make the appliance operation again, to avoid the icing of outdoor unit damage axial flow fan, should electrify the appliance but not operation for 4 hours for warm-up purpose(only for Heat Pump models).

Basic Requirements For Installation Position

Install in the following place may cause malfunction. If it is unavoidable contact with service center please:

- Place where strong heat sources, vapors, flammable gas or volatile object are emitted.
- Place where high-frequency waves are generated by radio equipment, welders and medical equipment.
- Place where a lot of salinities such as coast exists.
- Place where the oil (machine oil) is contained in the air.
- Place where a sulfured gas such as the hot spring zones is generated.
- Other place with special circumstance.

Indoor Unit Installation Position Selection

1. The air inlet and outlet vent should be far from the obstruction, make sure that the air can be blown through the whole room.
2. Select a position where the condensing water can be easily drained out, and the place is easily connected for outdoor unit.
3. Select a location where the children can not reach.
4. Can select the place where is strong enough to withstand the full weight and vibration of the unit. And will not increase the noise.
5. Be sure to leave enough space to allow access for routine maintenance. The height of the installed location should be 8ft or more from the floor.
6. Select a place about 1m or more away from TVset or any other electric appliances.
7. Select a place where the filter can be easily taken out.
8. Make sure that the indoor unit installation should accord with installation dimension diagram requirements.
9. Do not use the unit in the immediate surroundings of a laundry a bath a shower or a swimming pool.

Outdoor Unit Installation Position Selection

1. Select a location from which noise and outflow air emitted by unit will not inconvenience neighbors, animals, plants.
2. Select a location where there should be sufficient ventilation.
3. Select a location where there should be no obstructions cover the inlet and outlet vent .
4. The location should be able to withstand the full weight and vibration of the outdoor unit and permit safe installation.
5. Select a dry place, but do not expose under the direct sunlight or strong wind.
6. Make sure that the outdoor unit installation dimension should accord with installation dimension diagram, convenient for maintenance, repair.
7. The height difference of connecting the tubing within 16ft, the length of connecting the tubing within 32ft.
8. Select a place where it is out of reach for the children.
9. Select a place where will not block the passage and do not influence the city appearance.

Safety Requirements For Electric Appliances

1. The power supply should be used the rated voltage and AC exclusive circuit, the power cable diameter should be satisfied.
2. Don't drag the power cable emphatically.
3. It should be reliably earthed, and it should be connected to the special earth device, the installation work should be operated by the professional.
The air switch must have the functions of magnetic tripping and heat tripping, in order to protect the short circuit and overloading.
4. The min. distance from the unit and combustive surface is 5ft.
5. The appliance shall be installed in accordance with national wiring regulations.
6. An all-pole disconnection switch having a contact separation of at least 3mm in all poles should be connected in fixed wiring.

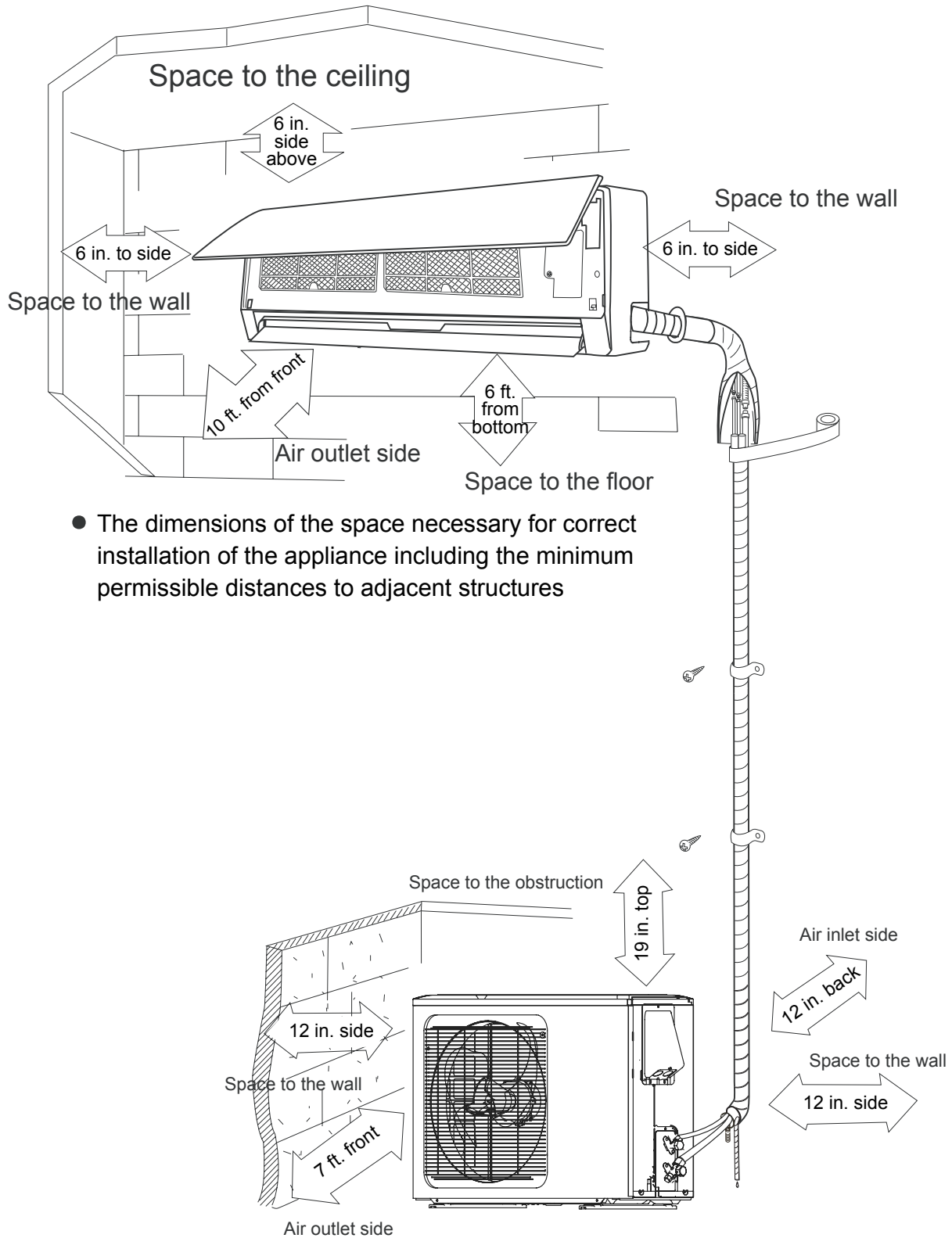
Note:

- Make sure that the Live wire or Zero line as well as the ground wire in the family power socket can not be wrong connected, there should be reliable and no short circuit in the diagram.
- wrong connection may cause fire.

Ground requirements

1. Air conditioner is type I electric appliance, thus please do conduct reliable earthing measure.
2. The yellow-green two-color wire in air conditioner is earthing wire and cannot be used for other propose. It cannot be cut off and be fix it by screw, otherwise it would cause electric shock.
3. The earth resistance should accord to the National Criterion.
4. The user power must offer the reliable grounding terminal. Please don't connect the earthing wire with the following place:
 - ① Tap water pipe. ② Gas pipe. ③ Contamination pipe.
 - ④ Other places that professional personnel consider them unreliable.
5. The model and rating values for fuses according the silk print on fuse cover or related PCB board.

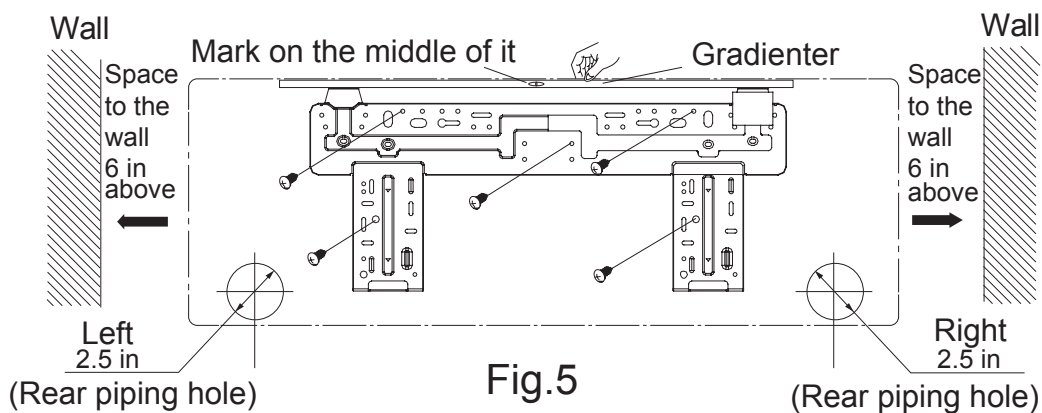
7.2 Installation dimension diagram



7.3 Installing Indoor Unit

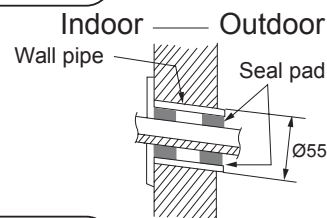
Installing Mounting Plate

1. Make the mounting plate completely level. As the water tray's outlet of the indoor unit is two-way type, the indoor unit during installation should slightly slant to water tray's outlet for smooth drainage of condensing water.
2. Fix the mounting plate on the wall with screws. (Where is pre-covered with plastic granula)
3. Be sure that the mounting plate has been fixed firmly enough to withstand the weight of an adult of 60kg; further more, the weight should be evenly shared by each screw.



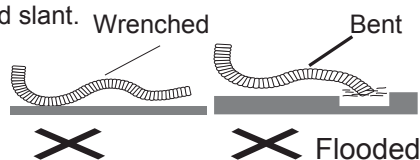
Boring Piping Hole

1. Make the piping hole (2.5 in) in the wall at a slight downward slant to the outdoor side.
2. Insert the piping-hole sleeve into the hole to prevent the connection piping and wiring from being damaged when passing through the hole.



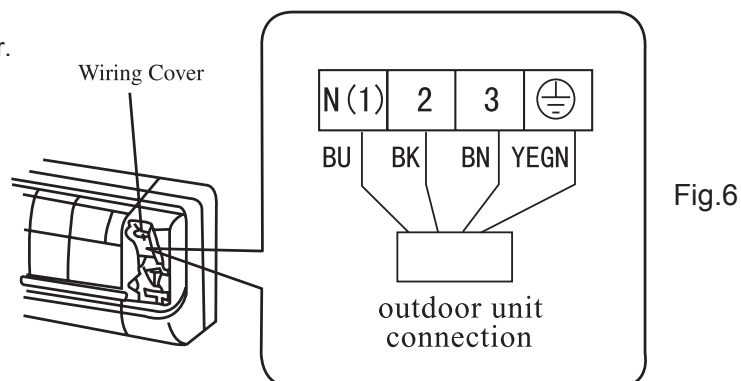
Installing Drain Hose

1. For proper draining, the drain hose should be placed at a downward slant.
2. Do not wrench or bend the drain hose or flood its end by water.
3. The long drain hose passing through indoor areas should be wrapped with insulation material.



Connecting Indoor and Outdoor Electric Wires

1. Open the front panel.
2. Remove the wiring cover as shown in Fig 6.
3. Make the power connection cord and signal control wire (only for heat pump unit) through the hole in the the back of indoor unit.
4. Reinstall the clamp and wiring cover.
5. Reconvert he front panel.



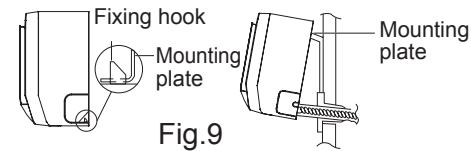
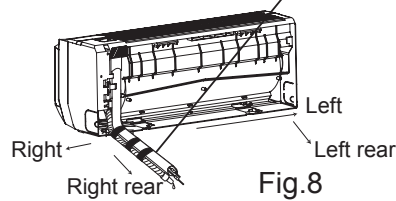
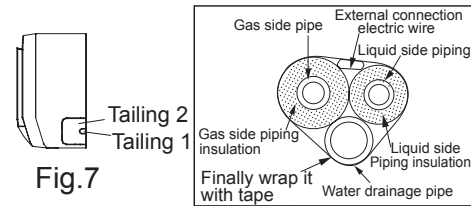
NOTE:

All interconnecting wiring between indoor and outdoor unit must be performed by a licenced electrical contractor

- The electric wiring must be correctly connected. Improper connection may cause spare parts malfunction.
- Tighten the terminal screws adequately to prevent loosening.
- After tightening the screws, slightly pull the wire and confirm whether it is firm or not.
- Ensure the electrical connections are properly earthed to prevent electrical shocks.
- Ensure all wiring connections are secure and the cover plates are reinstalled properly. Poor installations that allow dust or moisture incursion may cause fire or electrocution.

Installing Indoor Unit

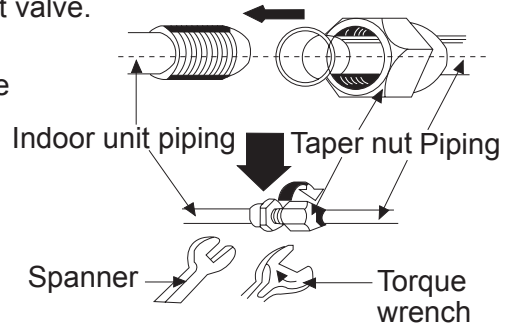
- The piping can be output from right, right rear, left or left rear.
1. When routing the piping and wiring from the left or right side of indoor unit, cut off the tailings from the chassis as necessary (As shown in Fig.7)
 - (1) Cut off the tailings 1 when routing the wiring only;
 - (2) Cut off the tailings 1 and tailings 2 when routing both the wiring and piping.
 2. Take out the piping from body case, wrap the piping, power cords, drain hose with the tape and make them through the piping hole. (As shown in Fig.8)
 3. Hang the mounting slots of the indoor unit on the upper hooks of the mounting plate and check if it is firm enough. (As shown in Fig.9)
 4. The height of the installed location should be 6ft or more from the floor.



Installing Connection Pipe

1. Align the center of the piping flare with the relevant valve.
2. Screw in the flare nut by hand and then tighten the nut with spanner and torque wrench referring to the following:

Hex nut diameter	Tightening torque (lb ft)
Φ6	11 ~ 14.7
Φ 9.52	22.8 ~ 25.8
Φ 12	36.9 ~ 40.6
Φ 16	44.3 ~ 47.9
Φ 19	51.6 ~ 55.3

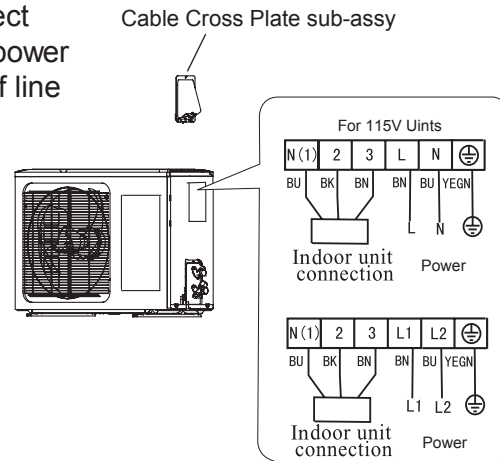


NOTE: Firstly connect the connection pipe to indoor unit, then to outdoor unit; pay attention to the piping bending, do not damage the connection pipe; ensure the joint nut is adequately tightened, otherwise it may cause leakage.

7.4 Installing Outdoor Unit

Electric wiring

1. Disassemble the cable cross plate sub-assy on the outdoor unit right side plate.
2. Take off wire clamp. Connect and fix power connect cord (for cooling and heating unit, connect and fix power connect cord and signal control wire) to terminal of line bank. Wiring should fit that of indoor unit.
3. Fix the power connection cable with wire clamp, (for cooling and heating unit, use the wire clamp to fix the power connection cable and the signal control wire), then connect the corresponding connector.
4. Ensure wire has been fixed well.
5. Install the cable cross plate sub-assy.



NOTE:

- Wrong wiring may cause spare parts malfunction.
- After the cable fixed, make sure there should be a free space between the connection and connection and fixing place on the lead wire.

*Note: Terminal 2 is the communication connection

Air purging and leakage test

1. Connect charging hose of manifold valve to charge end of low pressure valve (both high/low pressure valves must be tightly shut).
2. Connect joint of charging hose to vacuum pump.
3. Fully open handle handle of Lo manifold valve.
4. Open the vacuum pump to evacuate. At the beginning, slightly loosen joint nut of low pressure valve to check if there is air coming inside. (If noise of vacuum pump has been changed, the reading of multimeter is 0) Then tighten the nut.
5. Keep evacuating for more than 15mins and make sure the reading of multi-meter is $-1.0 \times 10^5 \text{pa}$ (-76cmHg).
6. Fully open high/low pressure valves.
7. Remove charging hose from charging end of low pressure valve.
8. Tighten bonnet of low-pressure valve. (As shown in Fig.10)

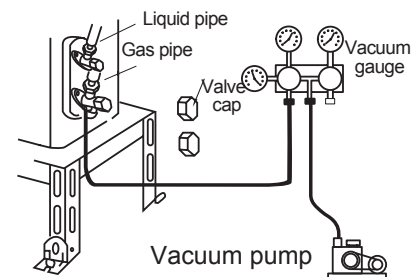
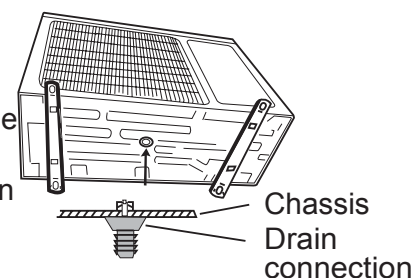


Fig. 10

Condensate drainage of outdoor unit (not for cooling only)

The condensate and defrosting water formed during heating in the outdoor unit can be properly discharged by drainage pipe.

Installation method: set the drain connection in $\varnothing 25$ hole of the chassis has been installed and then connect drainage pipe with drain nozzle, so that condensate and defrosting water can be properly discharged



7.5 Check after Installation and Operation Test

Check after Installation

Items to be checked	Possible malfunction
Has it been fixed firmly?	The unit may drop, shake or emit noise.
Have you done the refrigerant leakage test?	It may cause insufficient cooling(heating) capacity
Is heat insulation sufficient?	It may cause condensation and dripping.
Is water drainage satisfactory?	It may cause condensation and dripping.
Is the voltage in accordance with the rated voltage marked on the nameplate?	It may cause electric malfunction or damage the product.
Is the electric wiring and piping connection installed correctly and securely?	It may cause electric malfunction or damage the part.
Has the unit been connected to a secure ground connection?	It may cause electrical leakage.
Is the power cord specified?	It may cause electric malfunction or damage the part.
Are the inlet and outlet openings blocked?	It may cause insufficient cooling(heating) capacity.
Is the length of connection pipes and refrigerant capacity been recorded?	The refrigerant capacity is not accurate.

Operation Test

1. Before Operation Test

- (1) Do not switch on power before installation is finished completely.
- (2) Electric wiring must be connected correctly and securely.
- (3) Cut-off valves of the connection pipes should be opened.
- (4) All the impurities such as scraps and thrums must be cleared from the unit.

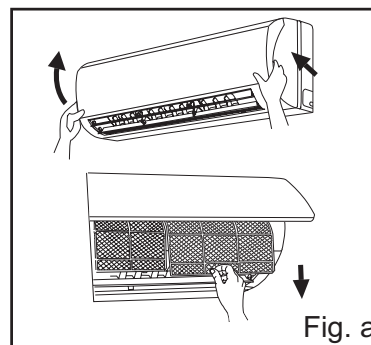
2. Operation Test Method

- (1) Switch on power and press "ON/OFF" button on the wireless remote controller to start the operation.
- (2) Press MODE button to select the COOL, HEAT (Cooling only unit is not available), FAN to check whether the operation is normal or not.

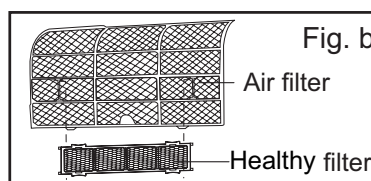
7.6 Installation and Maintenance of Healthy Filter(Optional)

Installation of Healthy Filter

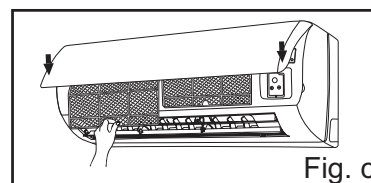
1. Lift up the front panel from the two ends of it, as the arrow direction shown. Then pull the air filter out. (as shown Fig.a)



2. Attach the healthy filter onto the air filter, (as shown in Fig.b).



3. Mount the air filter properly along the arrow direction in Fig.c, and then close the panel cover.



Cleaning and Maintenance

Remove the healthy filter before cleaning and re-install it after clean according to the installation instruction, but can't with brush or hard things. After washing, be sure to shake off remaining water and dry in the shade.

Service Life

The healthy filter commonly has its usage life time for one year under normal condition. As for silver ion filter, it is invalid when its surface becomes black (green).

- This supplementary instruction is provided for reference to the unit with healthy filter. If the graphics provided herein is different from the physical goods, the latter one shall prevail. The quantity of healthy filters shall be based on the actual delivery.

9. Troubleshooting

9.1 Precautions before Performing Inspection or Repair

Be cautious during installation and maintenance. Do operation following the regulations to avoid electric shock and casualty or even death due to drop from high altitude.

* Static maintenance is the maintenance during de-energization of the air conditioner.

For static maintenance, make sure that the unit is de-energized and the plug is disconnected.

* Dynamic maintenance is the maintenance during energization of the unit.

Before dynamic maintenance, check the electricity and ensure that there is ground wire on the site. Check if there is electricity on the housing and connection copper pipe of the air conditioner with voltage tester. After ensure insulation place and the safety, the maintenance can be performed.

Take sufficient care to avoid directly touching any of the circuit parts without first turning off the power.

At times such as when the circuit board is to be replaced, place the circuit board assembly in a vertical position.

Normally, diagnose troubles according to the trouble diagnosis procedure as described below. (Refer to the check points in servicing written on the wiring diagrams attached to the indoor/outdoor units.)

No.	Troubleshooting procedure
1	Confirmation
2	Judgement by Flashing LED of Indoor/Outdoor Unit
3	How to Check simply the main part

Precautions when inspecting the control section of the outdoor unit:

A large-capacity electrolytic capacitor is used in the outdoor unit controller (inverter). Therefore, if the power supply is turned off, charge (charging voltage DC280V to 380V) remains and discharging takes a lot of time. After turning off the power source, if touching the charging section before discharging, an electrical shock may be caused.

Please open the outdoor unit after the unit is power off for 20min.

9.2 Confirmation

(1) Confirmation of Power Supply

Confirm that the power breaker operates (ON) normally;

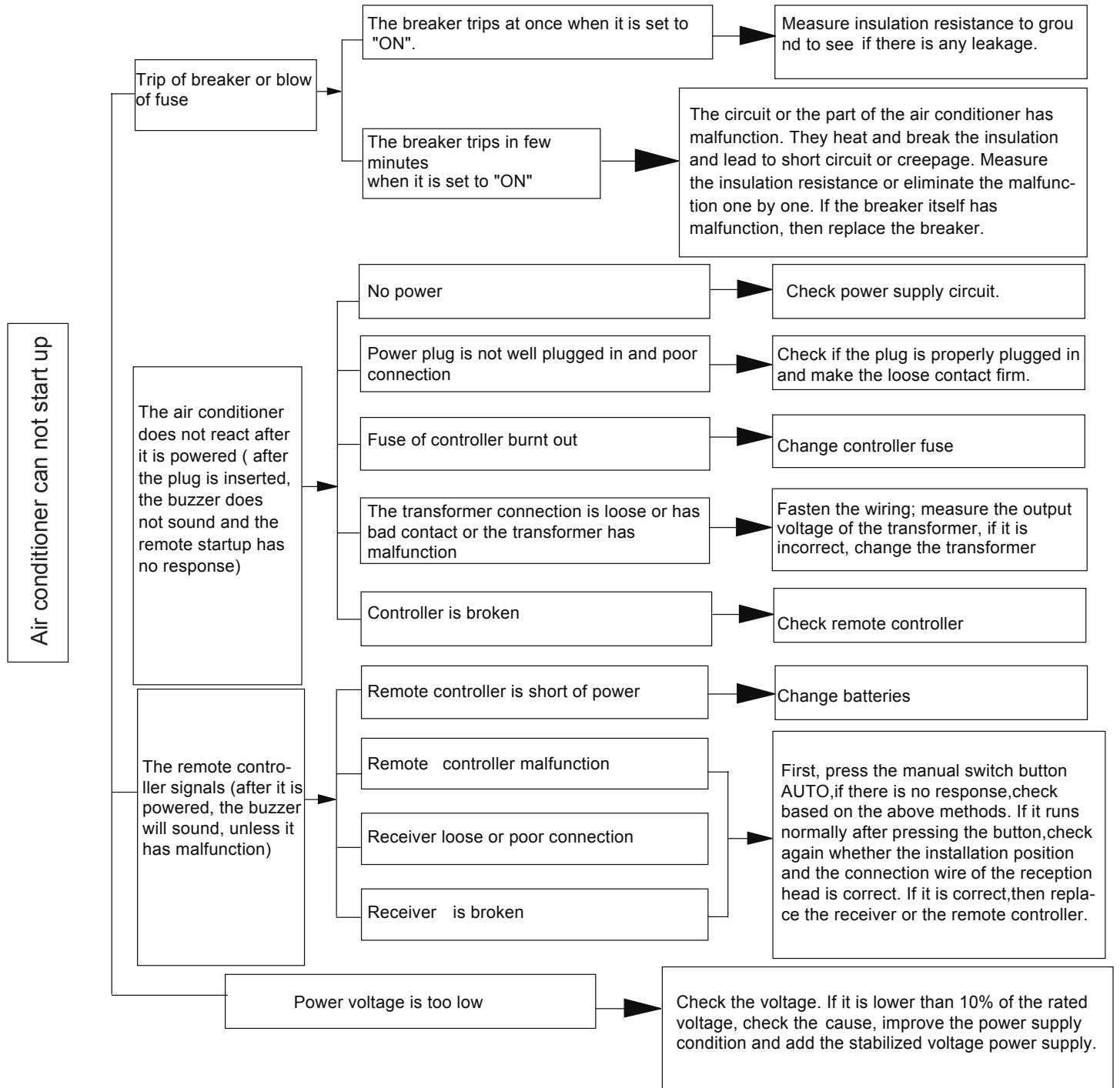
(2) Confirmation of Power Voltage

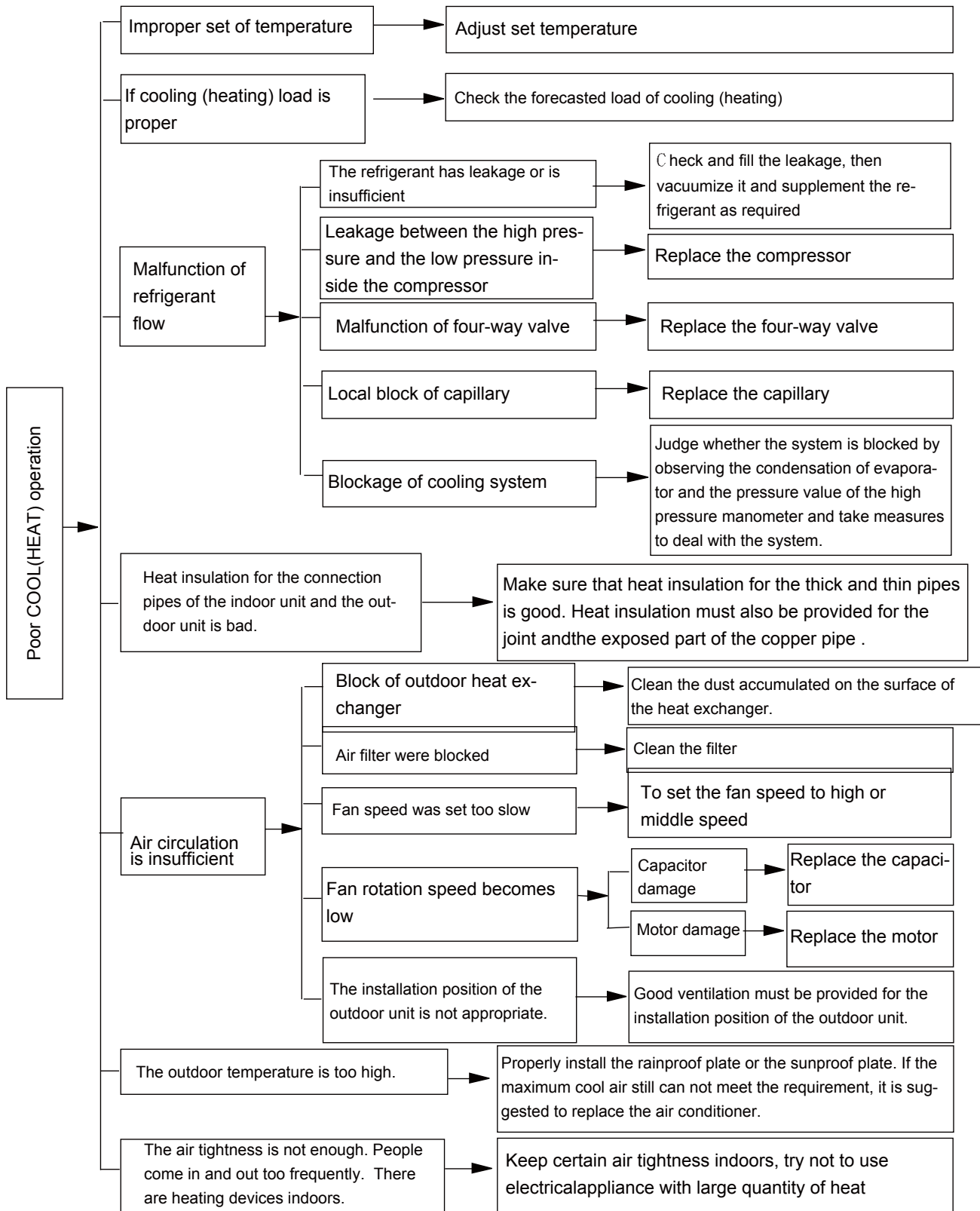
Confirm that power voltage is $AC115 \pm 10\%$.

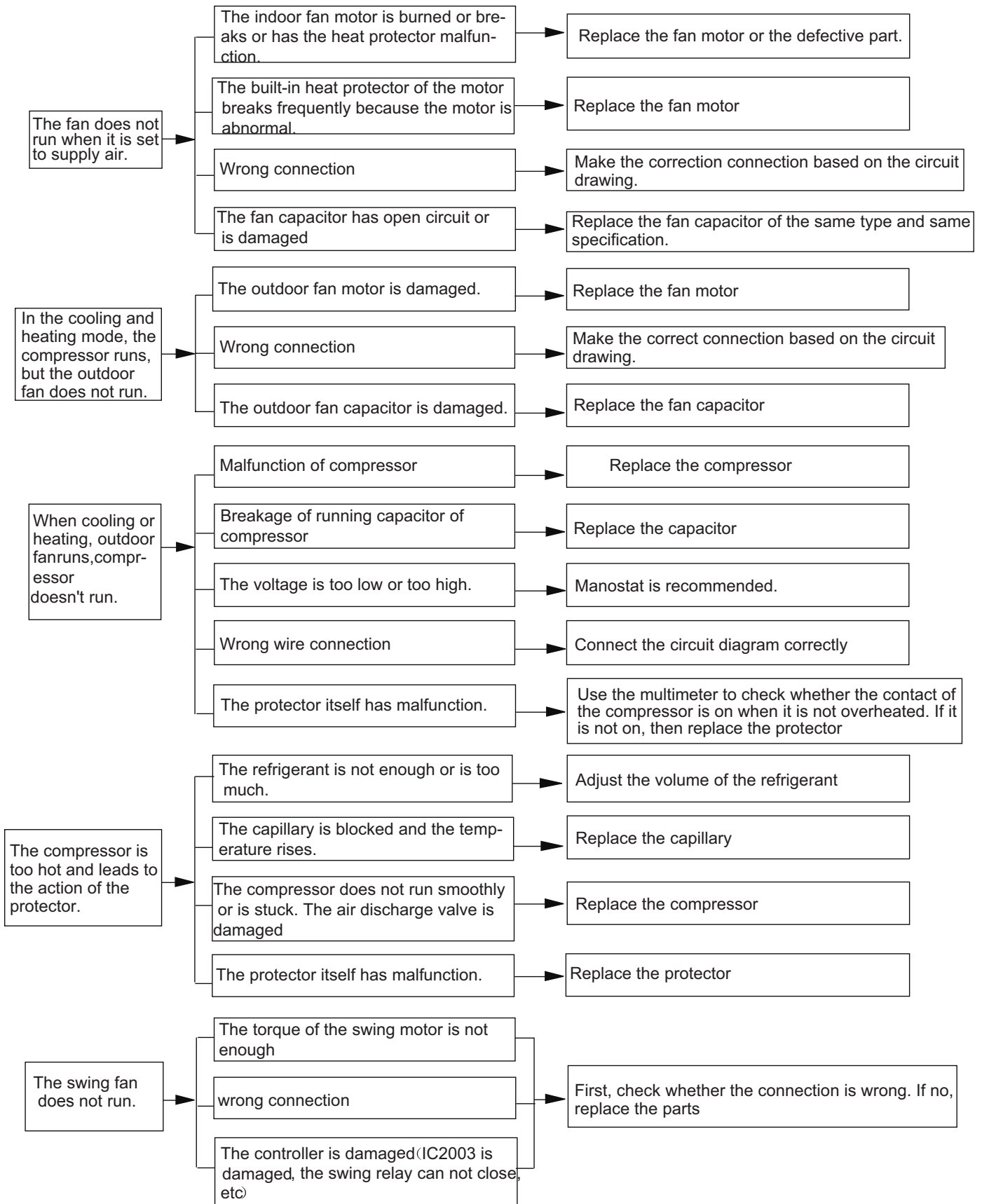
If power voltage is not in this range, the unit may not operate normally.

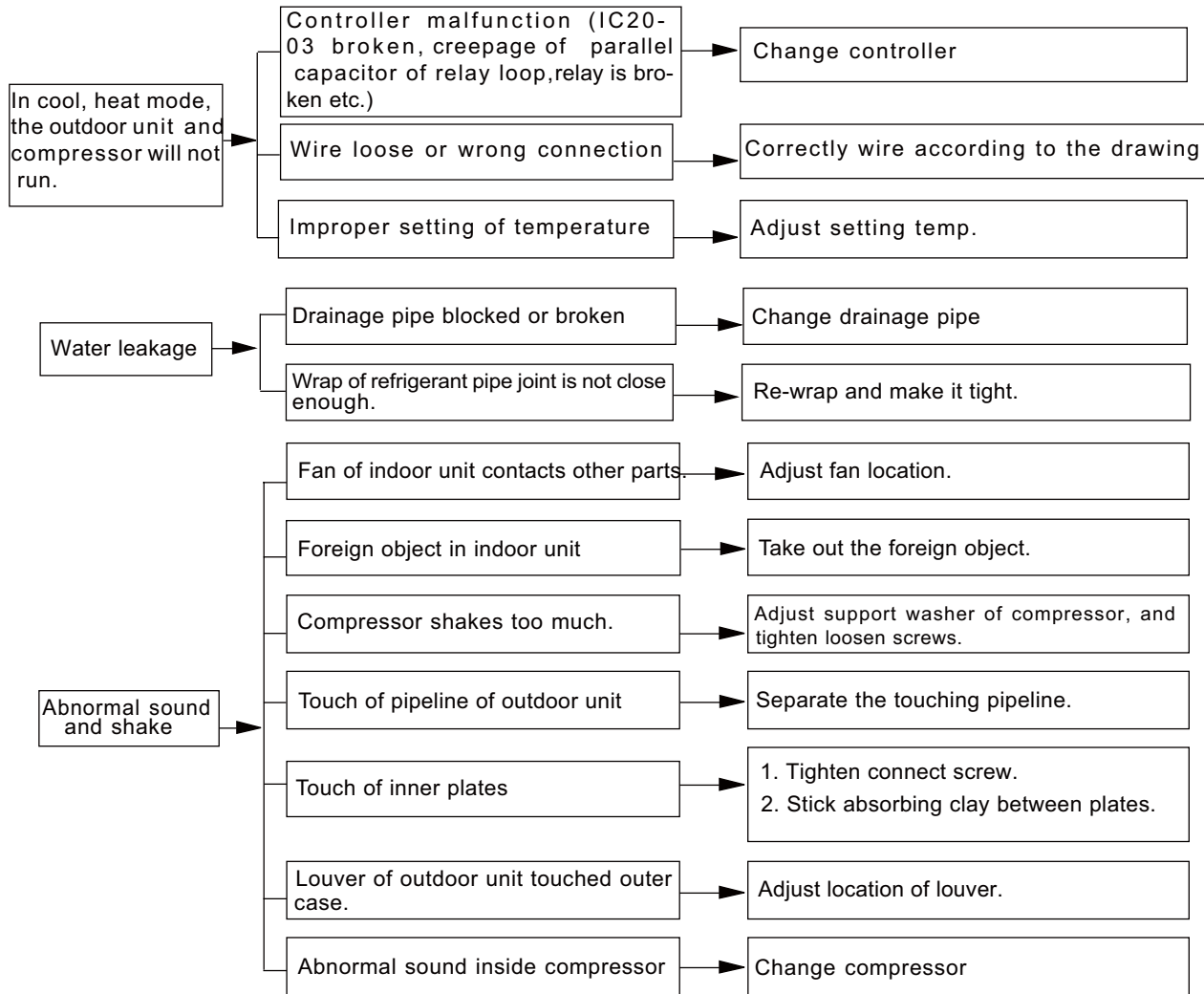
9.3 Judgement by Flashing LED of Indoor/Outdoor Unit

*Trouble shooting is for cooling and Heat Pump models.

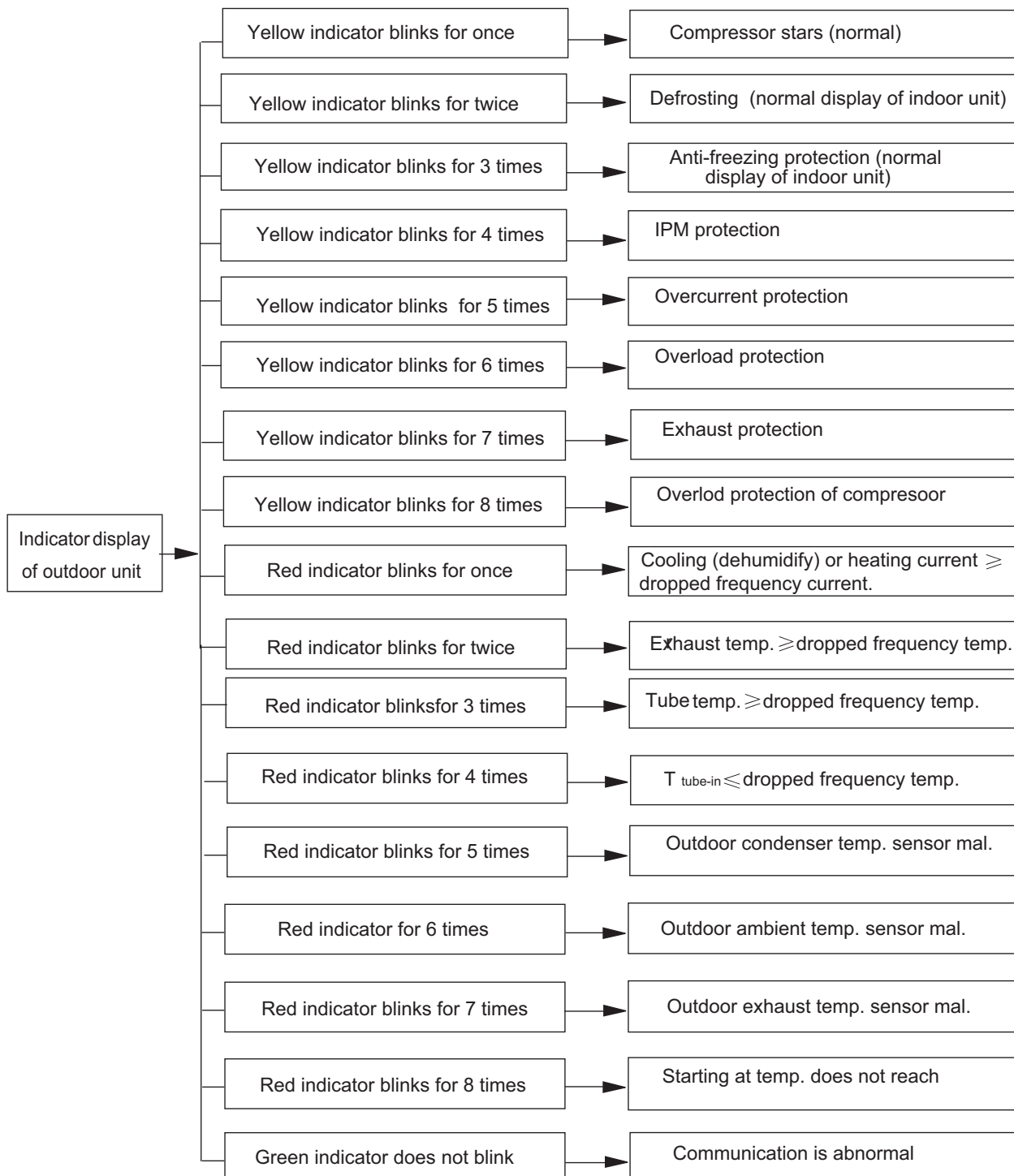




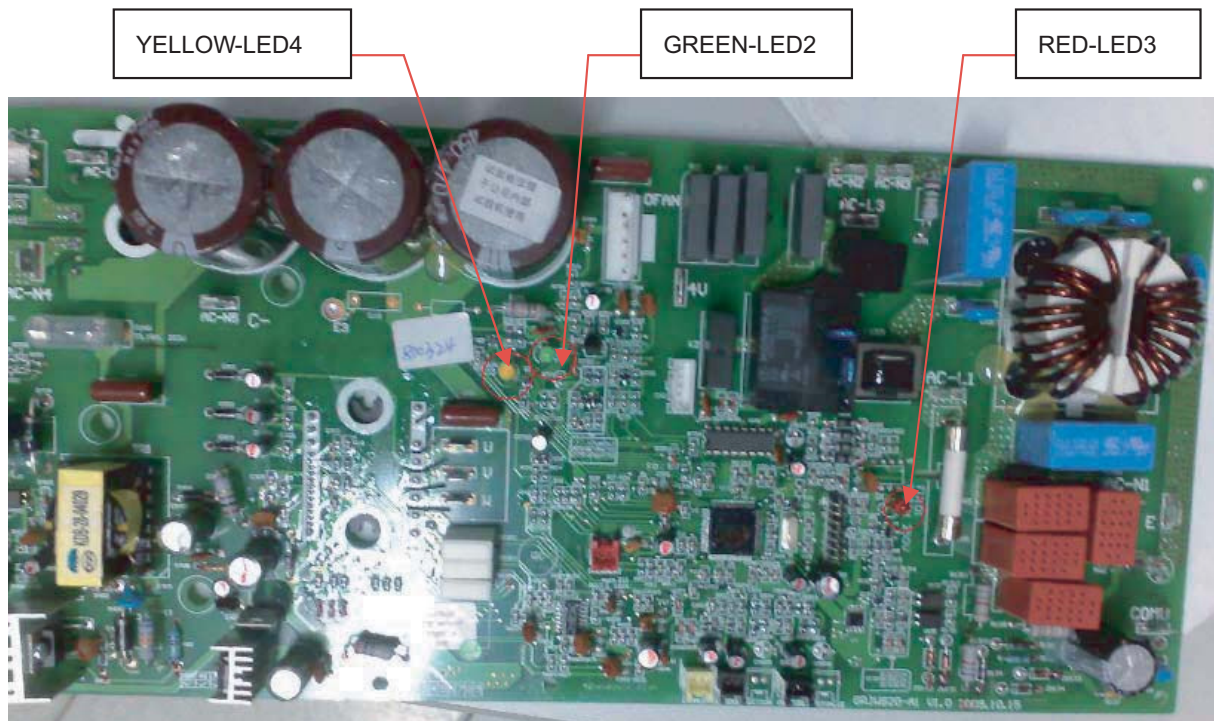




If malfunction occurs, corresponding code will display and the unit will resume normal until protection or malfunction disappears.



	Name of running status	Yellow light	Red light	Green light	Indoor unit display
1	Compressor start	Blink once			
2	Defrosting	Blink twice			H1
3	Anti-freezing protection	Blink three times			E2
4	IPM protection	Blink four times			H5
5	Overcurrent protection	Blink five times			E5
6	Overload protection	Blink six times			H4
7	Air exhaust protection	Blink seven times			E4
8	Overload protection	Blink eight times			H3
9	Limited frequency (current)		Blink once		
10	Limited frequency (Air exhaust)		Blink twice		
11	Limited frequency (overload)		Blink three times		
12	Limited frequency (anti-freezing)		Blink four times		
13	Outdoor unit ambient sensor malfunction		Blink five times		F3
14	Outdoor unit tube temp. sensor malfunction		Blink six times		F4
15	Outdoor air exhaust sensor malfunction		Blink seven times		F5
16	Achieve the temperature of unitstartsup		Blink eight times		
17	Communication is normal			Blink continuously	
18	Communication malfunction			OFF	E6
19	Overload sensor malfunction		Blink nine times		H3
20	Low voltage protection	Blink twelve times			PL
21	High voltage protection	Blink thirteen times			PH
22	Indoor ambient sensor malfunction				F1
23	Indoor tube temperature sensormalfunction				F2
24	Normal cooling or norminal heating				P1
25	Max. cooling or max. heating				P2
26	Interim cooling or interim heating				P3
27	Min. cooling or Min. heating				P0



Analysis or processing of some of the malfunction display:

1. Compressor discharge protection

Possible reasons: shortage of refrigerant; blockage of air filter; poor ventilation or air flow short pass for condenser; the system has noncondensing gas (such as air, water etc.); blockage of capillary assy (including filter); leakage inside four-way valve causes incorrect operation; malfunction of compressor; malfunction of protection relay; malfunction of discharge sensor; outdoor temperature too high.

Processing method: refer to the malfunction analysis in the above section.

2. Low voltage over current protection

Possible reason: Sudden drop of supply voltage.

3. Communication malfunction

Processing method: Check if communication signal cable is connected reliably.

4. Sensor open or short circuit

Processing method: Check whether sensor is normal, connected with the corresponding position on the controller and if damage if lead wire is found.

5. Compressor overload protection

Possible reasons: insufficient or too much refrigerant; blockage of capillary and increase of suction temp.; improper running of compressor, burning in or stuck of bearing, damage of discharge valve; malfunctioning of protector.

Processing method: adjust refrigerant amount; replace the capillary; replace the compressor; use universal meter to check if the contactor of compressor is fine when it is not overheated, if not replace the protector.

6. System malfunction

i.e. overload protection. When tube temperature (Check the temperature of outdoor heat exchanger when cooling and check the temperature of indoor heat exchanger when heating) is too high, protection will be activated.

Possible reasons: Outdoor temperature is too high when cooling; insufficient outdoor air circulation; refrigerant flow malfunction.

please refer to the malfunction analysis in the previous section for handling method .

7. IPM module protection

Processing method: Once the module malfunction happens, if it persists for a long time and can not be self- canceled, cut off the power and turn off the unit, and then re-energize the unit again after about 10 min. After repeating the procedure for sever times, if the malfunction still exists, replace the module.

9.4 How to Check simply the main part

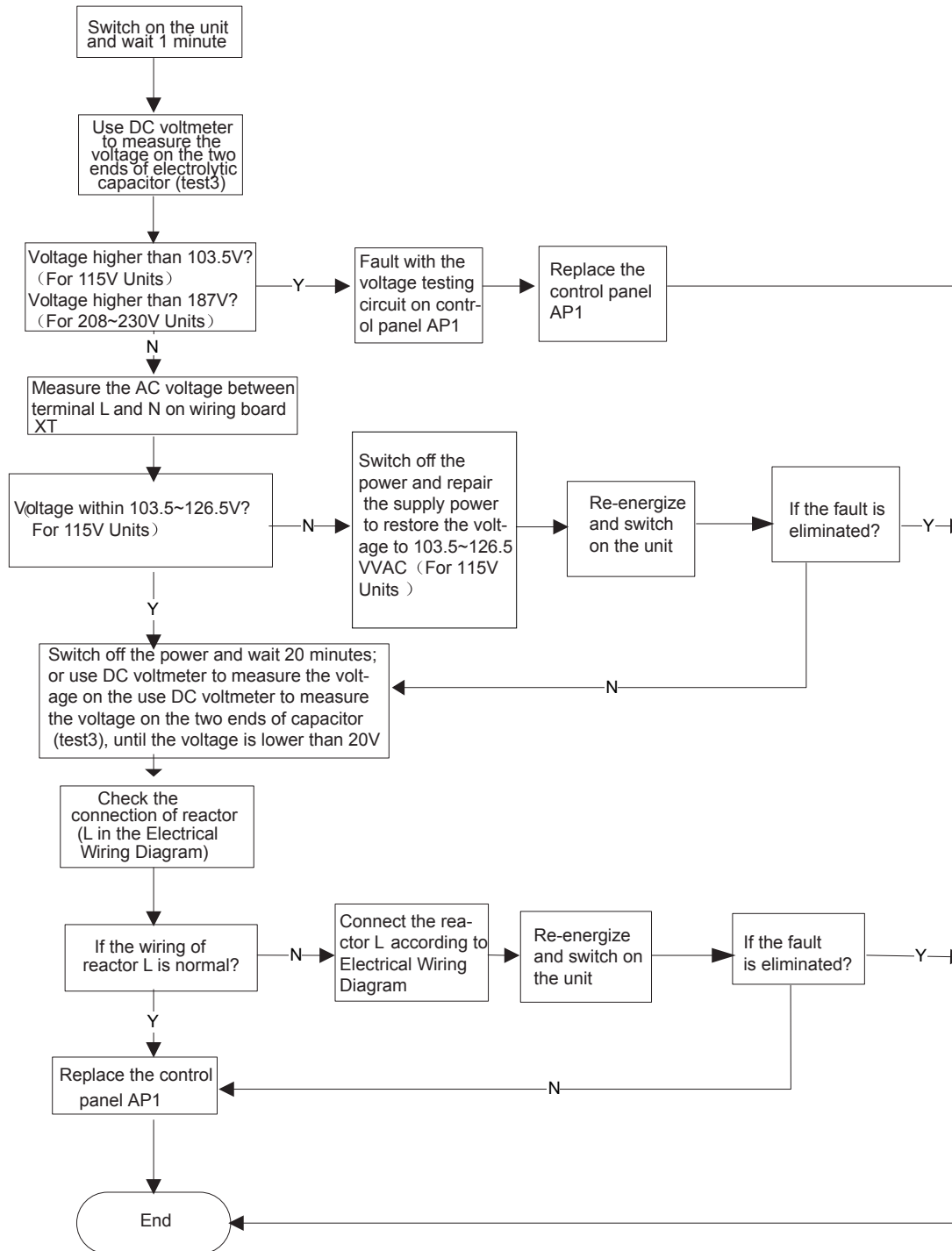
(1) Capacitor charge fault (Fault with outdoor unit) (AP1 below refers to the outdoor control panel)

Main Check Points:

Units of 115V: Use AC voltmeter to check whether the voltage between terminal L and N on the wiring board is 115V AC

Units of 115V: Whether the reactor (L) is correctly connected? Whether the connection is loose or fallen? Whether the reactor (L) is damaged?

Fault diagnosis process:

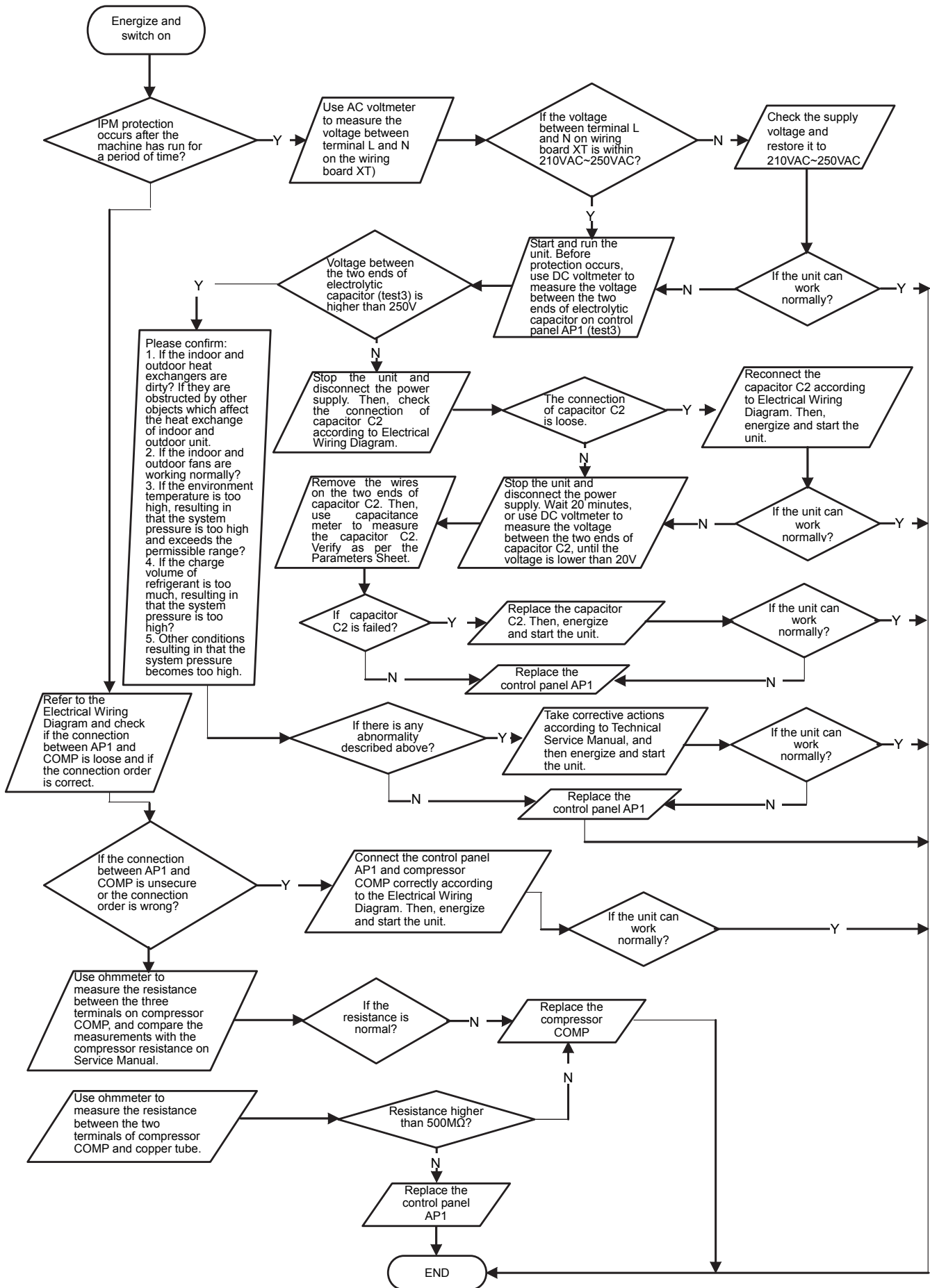


(2) IPM Protection, Out-of-step Fault, Compressor Phase Overcurrent (AP1 below refers to the outdoor control panel)

Mainly detect:

- Whether the connection between control panel AP1 and compressor COMP is secure? Whether loose? Whether the connection is in correct order?
- Whether the voltage input of the machine is within normal range? (Use AC voltmeter to measure the voltage between terminal L and N on the wiring board XT)
- Whether the compressor coil resistance is normal? Whether the insulation of compressor coil against the copper tube is in good condition?
- Whether the working loads of the machine are too high? Whether the radiation is good?
- Whether the charge volume of refrigerant is correct?

Fault diagnosis process:



◆ Notices for use

Anti-cool wind function:

In "Heat" mode, under the following three kinds of state, if indoor heat exchanger doesn't arrive at certain temp., indoor fan will not act, in order to prevent cool wind blowing(within 2 mins):

1. Heating starts.
2. After Auto Defrost finished.
3. Heating under the low temperature.

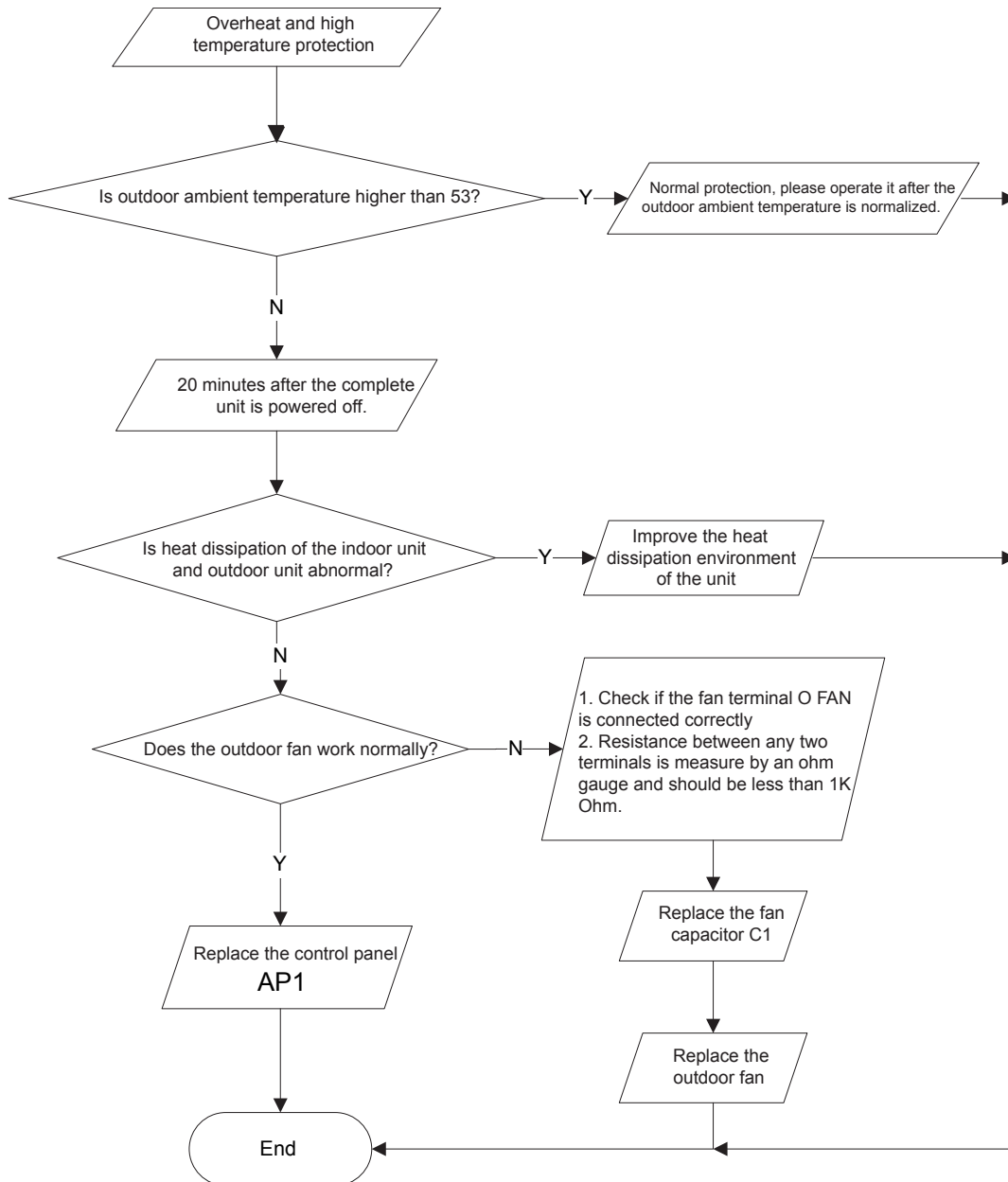
※ Working temperature range		
	Indoor sideDB/WB(°C)	Outdoor sideDB/WB(°C)
Maximum cooling	35/24	48/30
Minimum cooling	21/15	21/-
Maximum heating	24/-	21/15.5
Minimum heating	20/-	-15/-

The operating temperature range (outdoor temperature) for cooling unit is 70°F ~ 115°F for cooling and heating unit is 5°F ~ 115°F.

(3)High temperature and overload protection diagnosis (AP1 hereinafter refers to the control board of the outdoor unit)

Mainly detect:

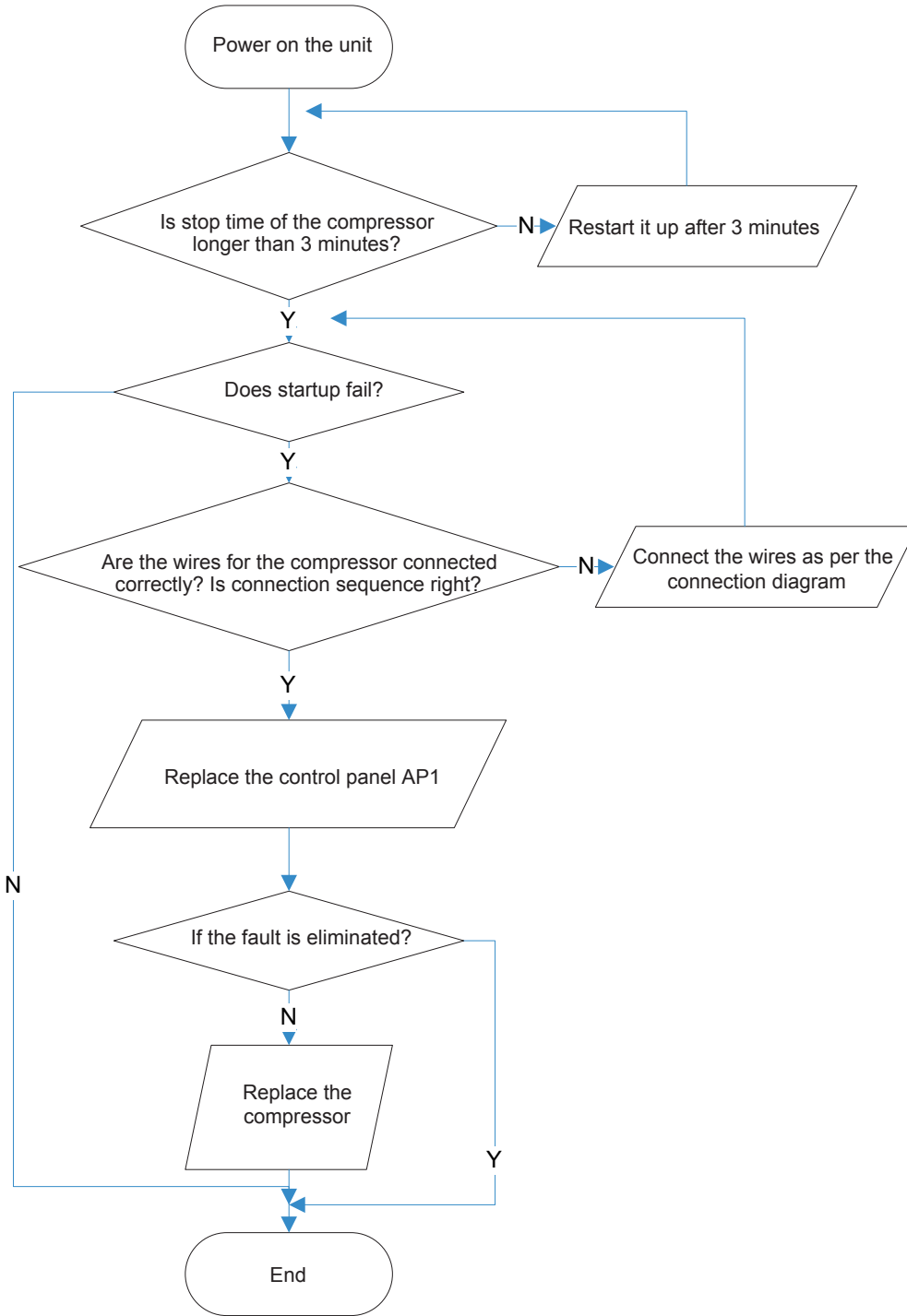
- Is outdoor ambient temperature in normal range?
- Are the outdoor and indoor fans operating normally?
- Is the heat dissipation environment inside and outside the unit is good?



(4) Fail for start up (following AP1 for outdoor unit control board)

Mainly detect:

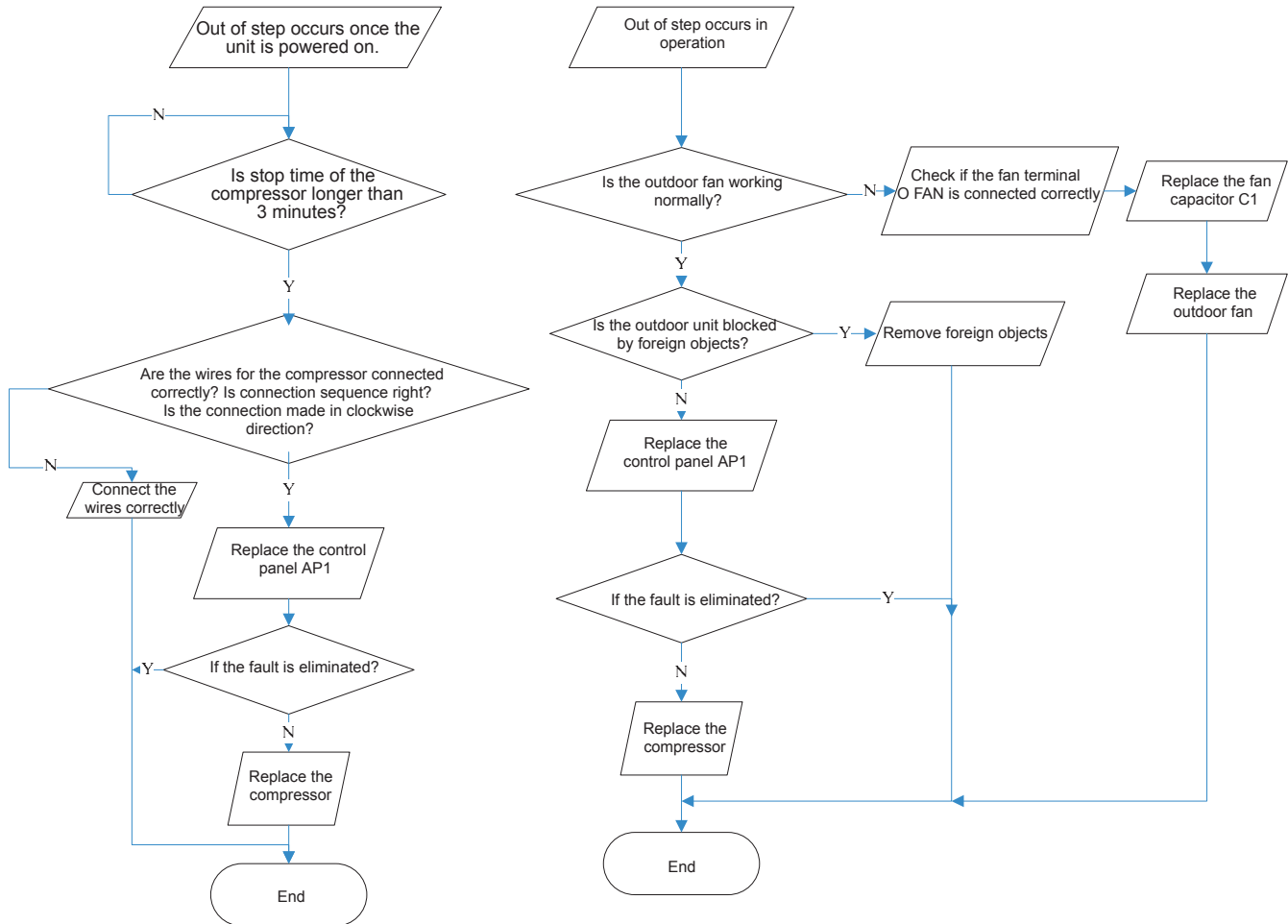
- Whether the compressor wiring is connected correct?
- Is time for compressor stopping enough?
- Is compressor broken?



(5) Out of step diagnosis for the compressor (AP1 hereinafter refers to the control board of the outdoor unit)

Mainly detect:

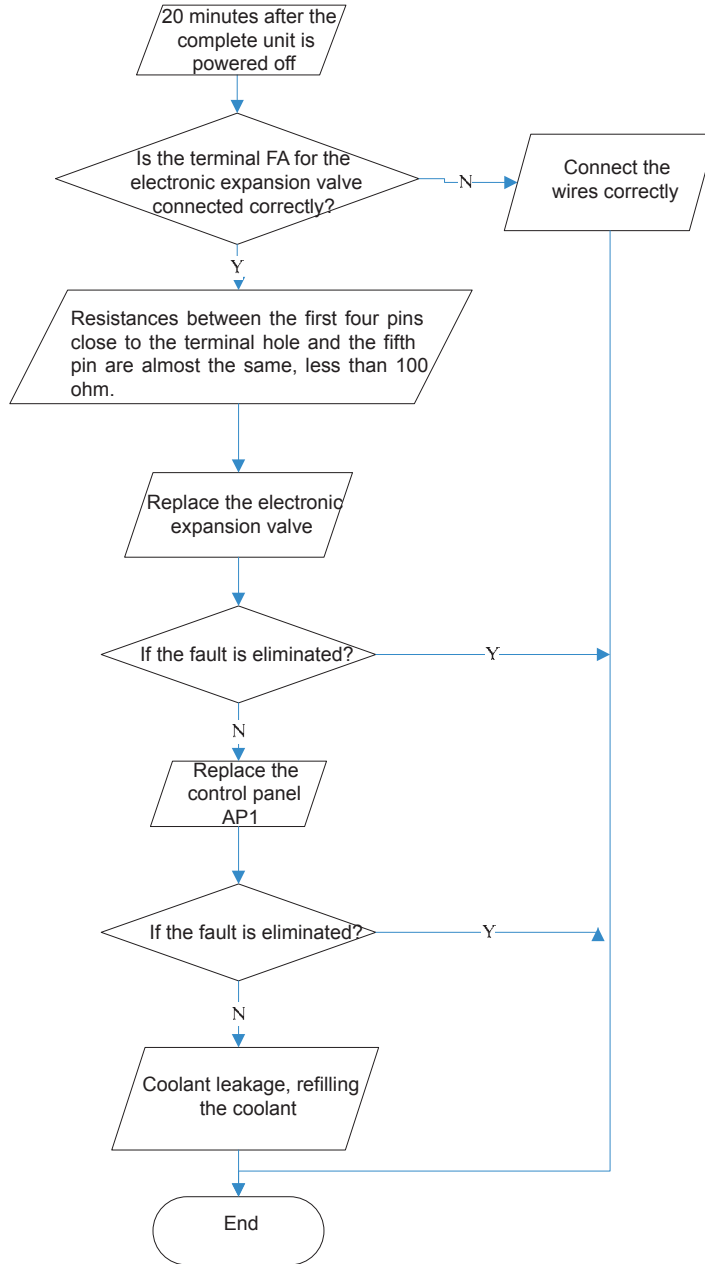
- Whether the unit voltage is too high?
- Whether the work voltage is too low?



(6)Overload and air exhaust malfunction detect (following AP1 for outdoor unit control board)

Mainly detect:

- Whether the electronic expansion valve is connected well or not? Is electronic expansion valve damaged?
- Is refrigerant leaked?

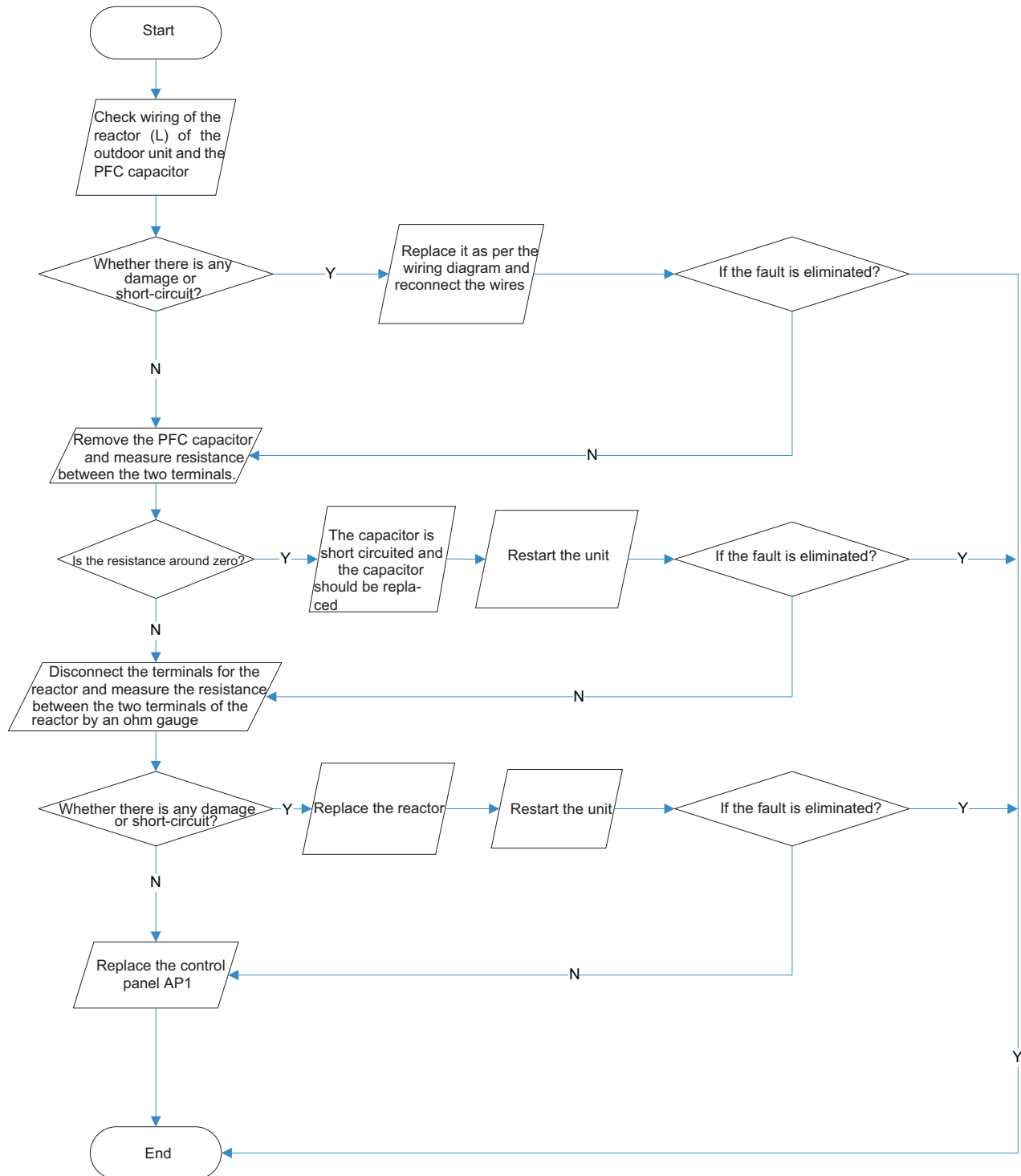


(7)Power factor correction (PFC) fault (a fault of outdoor unit) (AP1 hereinafter refers to the control board of the outdoor unit)

Mainly detect:

- Check if the reactor (L) of the outdoor unit and the PFC capacitor are broken

The failure diagnosis process is as follows:

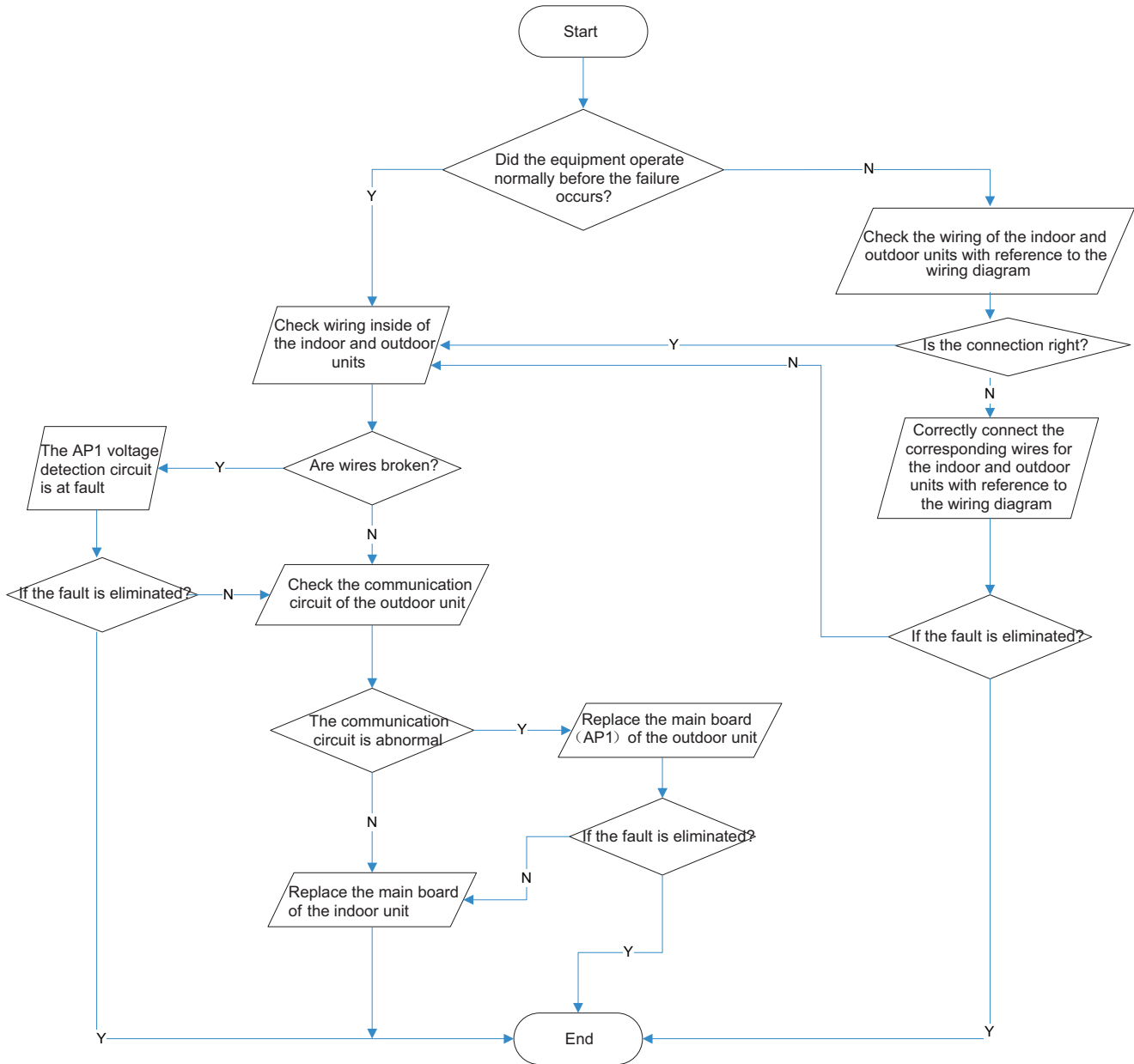


(8) Communication malfunction: (following AP1 for outdoor unit control board)

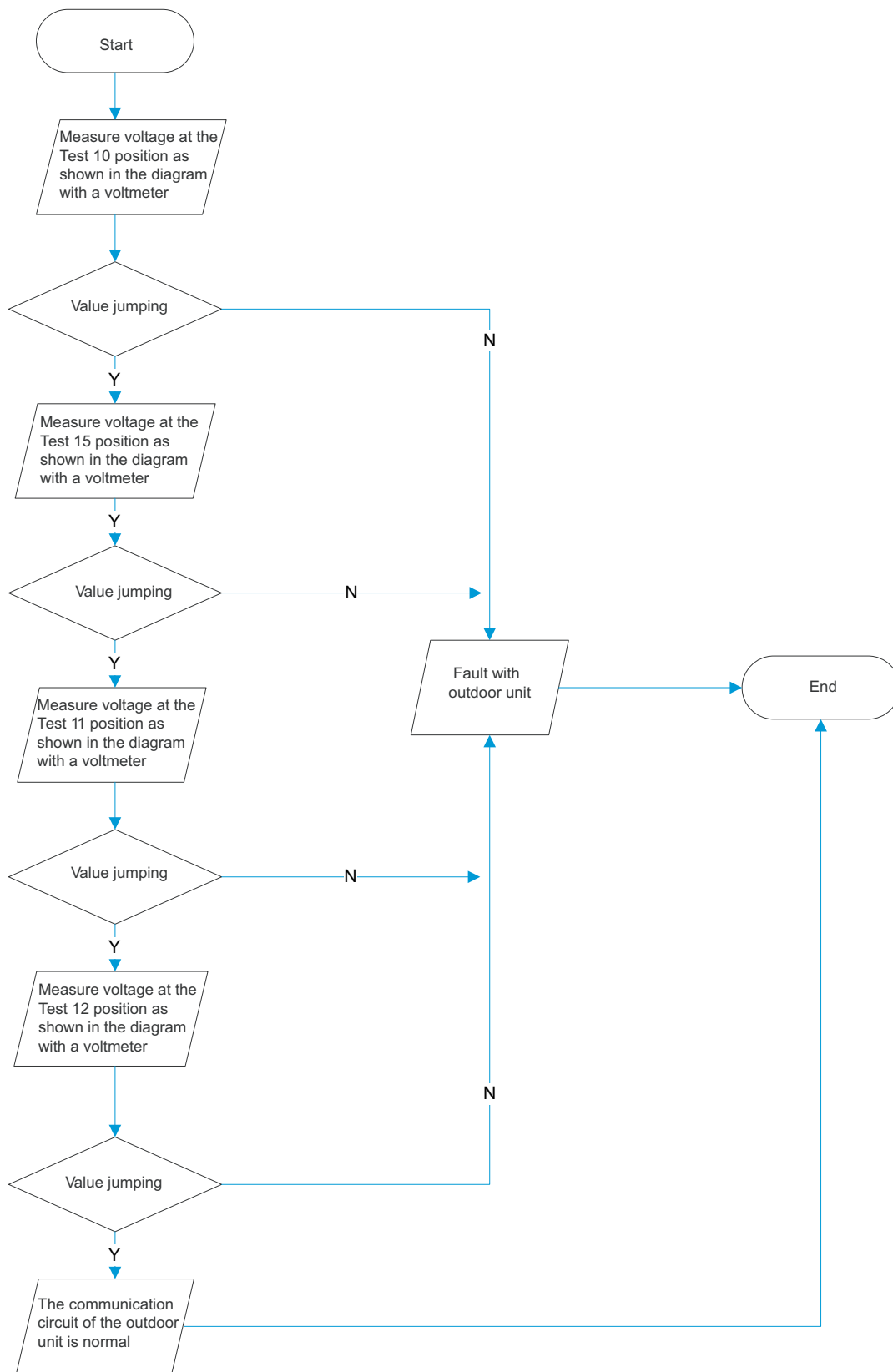
Mainly detect:

- Detect the indoor and outdoor units connection wire and indoor and outdoor units inside wiring is connect well or not, if is there any damage?
- Is there any damage for the indoor unit mainboard communication circuit? Is communication circuit damaged?

The flow chart for malfunction detect:

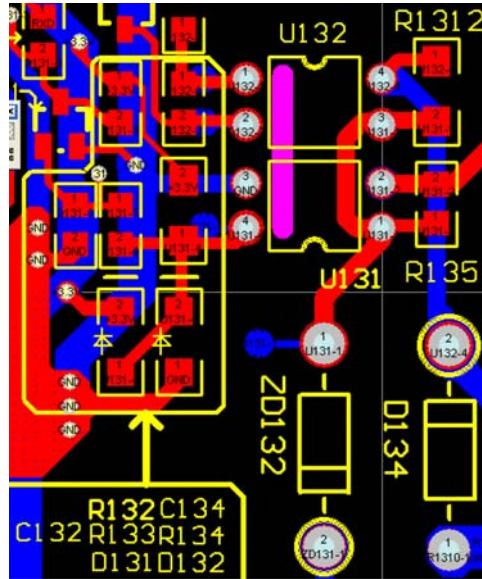


(9) Flow chart for outdoor communication circuit detecting:

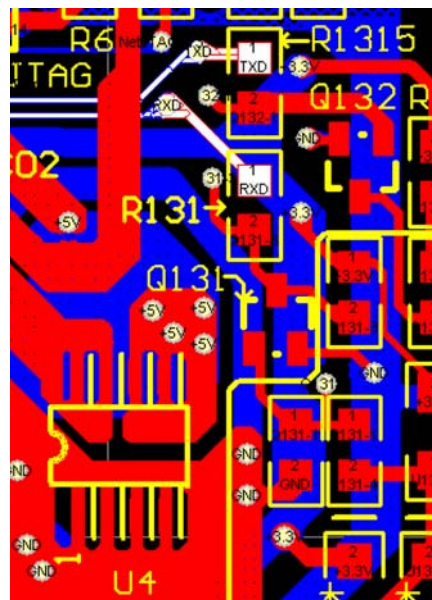


(9) Flow chart for outdoor communication circuit detecting:

- (1) Test the voltage between N point of wiring board and communication cable with universal meter. The voltage shall be variable. Otherwise, it might be malfunction of mainboard of indoor unit, or malfunction of mainboard of outdoor unit, or wrong wire connection of indoor and outdoor unit. Please ensure that there is no malfunction of mainboard of indoor unit, or wrong wire connection of indoor and outdoor unit. After removing the malfunction of indoor unit, remove the malfunction of outdoor unit.
- (2) Test the voltage of pin 1 and pin 2 of U132 with universal meter (voltage of both sides of R135). The voltage should be variable. (Test 10) Test the voltage of pin 3 and pin 4 of U132 with universal meter (voltage of both sides of R1312). The voltage should be variable. (Test 15) Otherwise, there is malfunction of mainboard of outdoor unit.



- (3) Test the voltage of pin 3 and pin 4 of U131 with universal meter (voltage of both sides of R134). The voltage should be variable. (test 11) Test the voltage of pin 1 and pin 2 of U132 with universal meter (voltage of both sides of C134). The voltage should be variable. (test 12) Otherwise, there is malfunction of mainboard of outdoor unit.
- (4) Test the voltage between pin 1 of R135 (white) and pin 1 of U4. The voltage should be variable. Test voltage between pin1 of R131 (white) and pin 1 of U4 with universal meter. The voltage should be variable. Otherwise, there is malfunction of mainboard of outdoor unit.



Appendix 1: form for indoor/outdoor unit's ambient sensor numerical value of resistance

Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)
-2	138.100	68	18.750	138	3.848	208	1.071
0	128.600	70	17.930	140	3.711	210	1.039
1	121.600	72	17.140	142	3.579	212	1.009
3	115.000	73	16.390	144	3.454	214	0.980
5	108.700	75	15.680	145	3.333	216	0.952
7	102.900	77	15.000	147	3.217	217	0.925
9	97.400	79	14.360	149	3.105	219	0.898
10	92.220	81	13.740	151	2.998	221	0.873
12	87.350	82	13.160	153	2.896	223	0.848
14	82.750	84	12.600	154	2.797	225	0.825
16	78.430	86	12.070	156	2.702	226	0.802
18	74.350	88	11.570	158	2.611	228	0.779
19	70.500	90	11.090	160	2.523	230	0.758
21	66.880	91	10.630	162	2.439	232	0.737
23	63.460	93	10.200	163	2.358	234	0.717
25	60.230	95	9.779	165	2.280	235	0.697
27	57.180	97	9.382	167	2.206	237	0.678
28	54.310	99	9.003	169	2.133	239	0.660
30	51.590	100	8.642	171	2.064	241	0.642
32	49.020	102	8.297	172	1.997	243	0.625
34	46.600	104	7.967	174	1.933	244	0.608
36	44.310	106	7.653	176	1.871	246	0.592
37	42.140	108	7.352	178	1.811	248	0.577
39	40.090	109	7.065	180	1.754	250	0.561
41	38.150	111	6.791	181	1.699	252	0.547
43	36.320	113	6.529	183	1.645	253	0.532
45	34.580	115	6.278	185	1.594	255	0.519
46	32.940	117	6.038	187	1.544	257	0.505
48	31.380	118	5.809	189	1.497	259	0.492
50	29.900	120	5.589	190	1.451	261	0.480
52	28.510	122	5.379	192	1.408	262	0.467
54	27.180	124	5.197	194	1.363	264	0.456
55	25.920	126	4.986	196	1.322	266	0.444
57	24.730	127	4.802	198	1.282	268	0.433
59	23.600	130	4.625	199	1.244	270	0.422
61	22.530	131	4.456	202	1.207	271	0.412
63	21.510	133	4.294	203	1.171	273	0.401
64	20.540	135	4.139	205	1.136	275	0.391
66	19.630	136	3.990	207	1.103	277	0.382

Troubleshooting Guide

Appendix 2: form for indoor/outdoor unit's tube temperature sensor numerical value of resistance

Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)
-2	181.400	68	25.010	138	5.130	208	1.427
0	171.400	70	23.900	140	4.948	210	1.386
1	162.100	72	22.850	142	4.773	212	1.346
3	153.300	73	21.850	144	4.605	214	1.307
5	145.000	75	20.900	145	4.443	216	1.269
7	137.200	77	20.000	147	4.289	217	1.233
9	129.900	79	19.140	149	4.140	219	1.198
10	123.000	81	18.130	151	3.998	221	1.164
12	116.500	82	17.550	153	3.861	223	1.131
14	110.300	84	16.800	154	3.729	225	1.099
16	104.600	86	16.100	156	3.603	226	1.069
18	99.130	88	15.430	158	3.481	228	1.039
19	94.000	90	14.790	160	3.364	230	1.010
21	89.170	91	14.180	162	3.252	232	0.983
23	84.610	93	13.590	163	3.144	234	0.956
25	80.310	95	13.040	165	3.040	235	0.930
27	76.240	97	12.510	167	2.940	237	0.904
28	72.410	99	12.000	169	2.844	239	0.880
30	68.790	100	11.520	171	2.752	241	0.856
32	65.370	102	11.060	172	2.663	243	0.833
34	62.130	104	10.620	174	2.577	244	0.811
36	59.080	106	10.200	176	2.495	246	0.770
37	56.190	108	9.803	178	2.415	248	0.769
39	53.460	109	9.420	180	2.339	250	0.746
41	50.870	111	9.054	181	2.265	252	0.729
43	48.420	113	8.705	183	2.194	253	0.710
45	46.110	115	8.370	185	2.125	255	0.692
46	43.920	117	8.051	187	2.059	257	0.674
48	41.840	118	7.745	189	1.996	259	0.658
50	39.870	120	7.453	190	1.934	261	0.640
52	38.010	122	7.173	192	1.875	262	0.623
54	36.240	124	6.905	194	1.818	264	0.607
55	34.570	126	6.648	196	1.736	266	0.592
57	32.980	127	6.403	198	1.710	268	0.577
59	31.470	130	6.167	199	1.658	270	0.563
61	30.040	131	5.942	202	1.609	271	0.549
63	28.680	133	5.726	203	1.561	273	0.535
64	27.390	135	5.519	205	1.515	275	0.521
66	26.170	136	5.320	207	1.470	277	0.509

Troubleshooting Guide

Appendix 3: form for indoor/outdoor unit's air exhaust temperature sensor numerical value of resistance

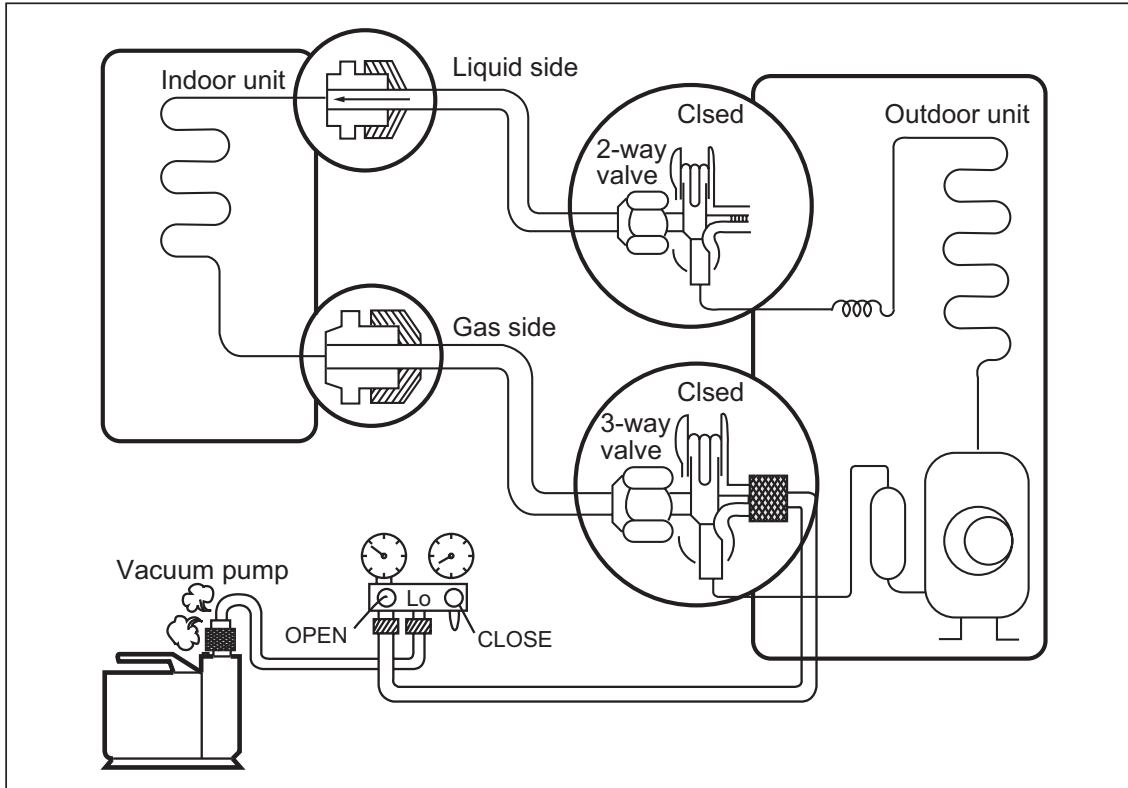
Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)
-2	853.500	68	98.000	138	18.340	208	4.754
0	799.800	70	93.420	140	17.650	210	4.609
1	750.000	72	89.070	142	16.990	212	4.469
3	703.800	73	84.950	144	16.360	214	4.334
5	660.800	75	81.050	145	15.750	216	4.204
7	620.800	77	77.350	147	15.170	217	4.079
9	580.600	79	73.830	149	14.620	219	3.958
10	548.900	81	70.500	151	14.090	221	3.841
12	516.600	82	67.340	153	13.580	223	3.728
14	486.500	84	64.330	154	13.090	225	3.619
16	458.300	86	61.480	156	12.620	226	3.514
18	432.000	88	58.770	158	12.170	228	3.413
19	407.400	90	56.190	160	11.740	230	3.315
21	384.500	91	53.740	162	11.320	232	3.220
23	362.900	93	51.410	163	10.930	234	3.129
25	342.800	95	49.190	165	10.540	235	3.040
27	323.900	97	47.080	167	10.180	237	2.955
28	306.200	99	45.070	169	9.827	239	2.872
30	289.600	100	43.160	171	9.489	241	2.792
32	274.000	102	41.340	172	9.165	243	2.715
34	259.300	104	39.610	174	8.854	244	2.640
36	245.600	106	37.960	176	8.555	246	2.568
37	232.600	108	36.380	178	8.268	248	2.498
39	220.500	109	34.880	180	7.991	250	2.431
41	209.000	111	33.450	181	7.726	252	2.365
43	198.300	113	32.090	183	7.470	253	2.302
45	199.100	115	30.790	185	7.224	255	2.241
46	178.500	117	29.540	187	6.998	257	2.182
48	169.500	118	28.360	189	6.761	259	2.124
50	161.000	120	27.230	190	6.542	261	2.069
52	153.000	122	26.150	192	6.331	262	2.015
54	145.400	124	25.110	194	6.129	264	1.963
55	138.300	126	24.130	196	5.933	266	1.912
57	131.500	127	23.190	198	5.746	268	1.863
59	125.100	130	22.290	199	5.565	270	1.816
61	119.100	131	21.430	202	5.390	271	1.770
63	113.400	133	20.600	203	5.222	273	1.725
64	108.000	135	19.810	205	5.060	275	1.682
66	102.800	136	19.060	207	4.904	277	1.640

9.5 2-way, 3-way Valve Appearance

		2-way Valve (Liquid Side)	3-way Valve (Gas Side)	
Works		Shaft position	Shaft position	Service port
Shipping		Closed (with valve cap)	Closed (with valve cap)	Closed (with cap)
1.	Air purging (Installation)	Closed (clockwise)	Closed (clockwise)	Open (with vacuum pump)
Operation		Open (with valve cap)	Open (with valve cap)	Closed (with cap)
2.	Pumping down (Transferring)	Closed (clockwise)	Open (counter-clockwise)	Open (connected manifold gauge)
3.	Evacuation (Servicing)	Open	Open	Open (with charging cylinder)
4.	Gas charging (Servicing)	Open	Open	Open (with charging cylinder)
5.	Pressure check (Servicing)	Open	Open	Open (with charging cylinder)
6.	Gas releasing (Servicing)	Open	Open	Open (with charging cylinder)

Air purging

CAUTION: Do not leak the gas in the air during Air purging.



*** Procedure**

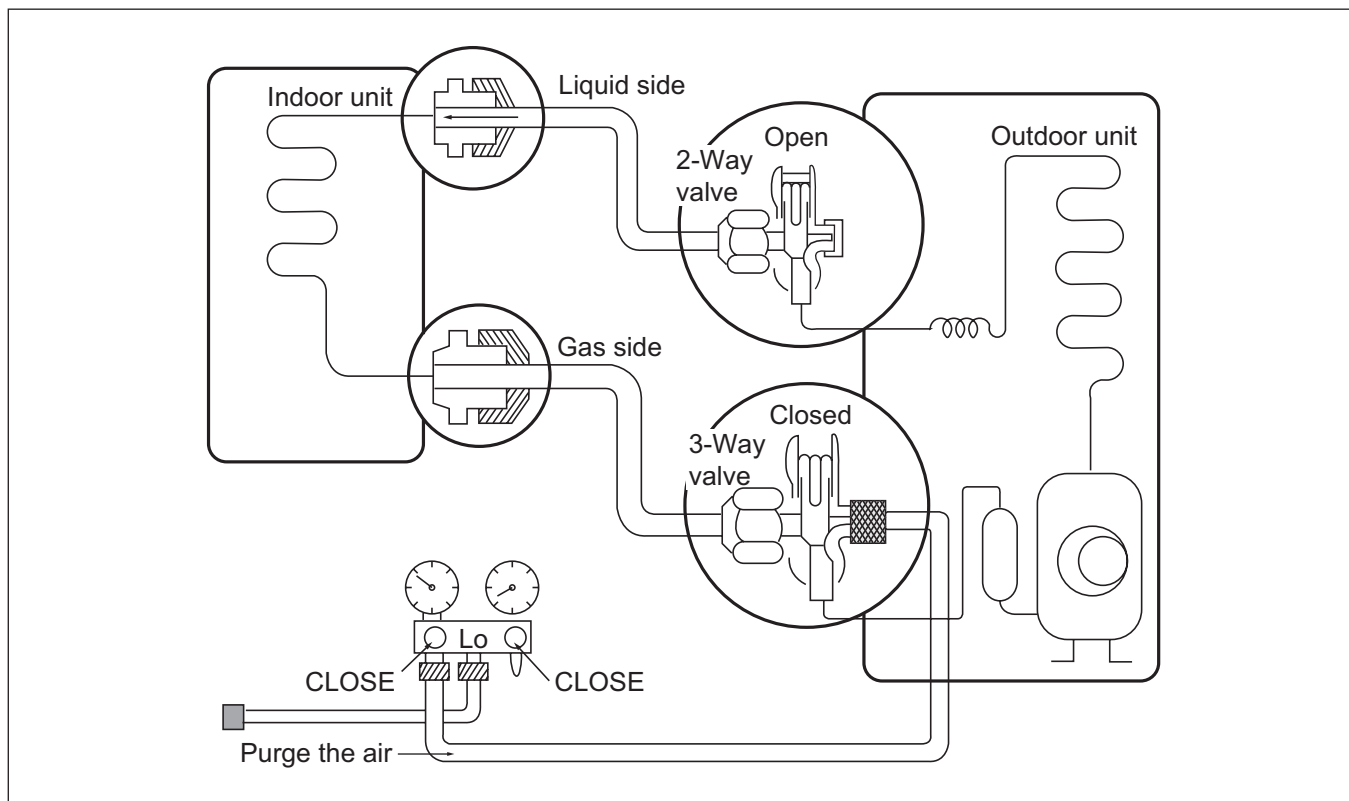
- (1) Connect the charge hose from the manifold valve to the service port of the gas side packed valve.
- (2) Connect the charge hose to the port of the vacuum pump.
- (3) Open fully the low pressure side handle of the gauge manifold valve.
- (4) Operate the vacuum pump to begin evacuating. Perform evacuating for about 15 minutes if the piping length is 20 meters (15 minutes for 20 meters) (assuming a pump capacity of 27 liters per minute). Confirm that the compound pressure gauge reading is -101 kPa (-76 cmHg).
- (5) Close the low pressure valve handle of gauge manifold.
 - Check the flare connections for gas leakage.
- (6) Use torque wrench to tighten the service port nut to a torque of 1.8 kg.cm .
- (7) Set the 3-way valve to the back seat.
- (8) Mount the valve stem nuts to the 2-way and 3-way valves.
- (9) Check for gas leakage.
 - At this time, especially check for gas leakage from the 2-way and 3-way valve's stem nuts, and from the service port nut.

CAUTION:

If gas leakage are discovered in step 5 above, take the following measures :

If the gas leaks stop when the piping connections are tightened further, continue working from step 6. If the gas leaks do not stop when the connections are retightened, repair the location of the leak, discharge all of the gas through the service port, and then recharge with the specified amount of gas from a gas cylinder.

Pumping Down



• Procedure

(1) Confirm that both the 2-way and 3-way valves are set to the open position.

- Remove the valve stem caps and confirm that the valve stems are in the raised position.
- Be sure to use a hexagonal wrench to operate the valve stems.

(2) Operate the unit for 10 to 15 minutes.

(3) Stop operation and wait for 3 minutes, then connect the charge set to the service port of the 3-way valve.

- Connect the charge hose with the push pin to the service port.

(4) Air purging of the charge hose.

- Open the low-pressure valve on the charge set slightly to air purge from the charge hose.

(5) Set the 2-way valve to the closed position.

(6) Operate the air conditioner at the cooling cycle and stop it when the gauge indicates 1kg/cm²g.

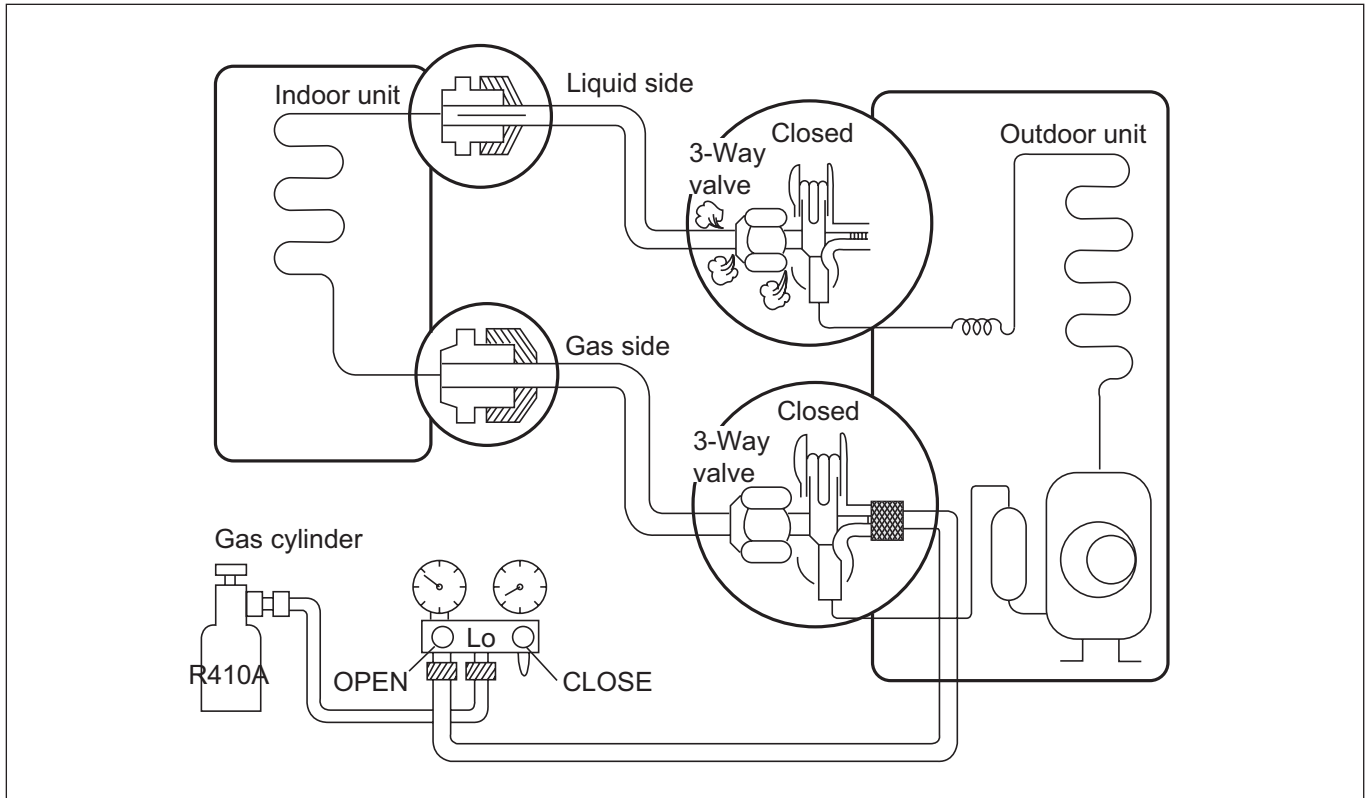
(7) Immediately set the 3-way valve to the closed position.

- Do this quickly so that the gauge ends up indicating 3 to 5kg/cm²g.

(8) Disconnect the charge set, and mount the 2-way and 3-way valve's stem nuts and the service port nut.

- Use torque wrench to tighten the service port nut to a torque of 1.8 kg.m.
- Be sure to check for gas leakage.

Re-air Purging



• Procedure

(1) Confirm that both the liquid side valve and the gas side valve are set to the closed position.

(2) Connect the charge set and a gas cylinder to the service port of the Gas side valve.

– Leave the valve on the gas cylinder closed.

(3) Air purging.

– Open the valves on the gas cylinder and the charge set. Purge the air by loosening the flare nut on the liquid side valve approximately 45° or 3 seconds then closing it for 1 minute; repeat 3 times.

– After purging the air, use a torque wrench to tighten the flare nut on liquid side valve.

(4) Check for gas leakage.

– Check the flare connections for gas leakage.

(5) Discharge the refrigerant.

– Close the valve on the gas cylinder and discharge the refrigerant until the gauge indicates 3 to 5 kg/cm²g.

(6) Disconnect the charge set and the gas cylinder, and set the Liquid side and Gas side valves to the open position.

– Be sure to use a hexagonal wrench to operate the valve stems.

(8) Mount the valve stem nuts and the service port nut.

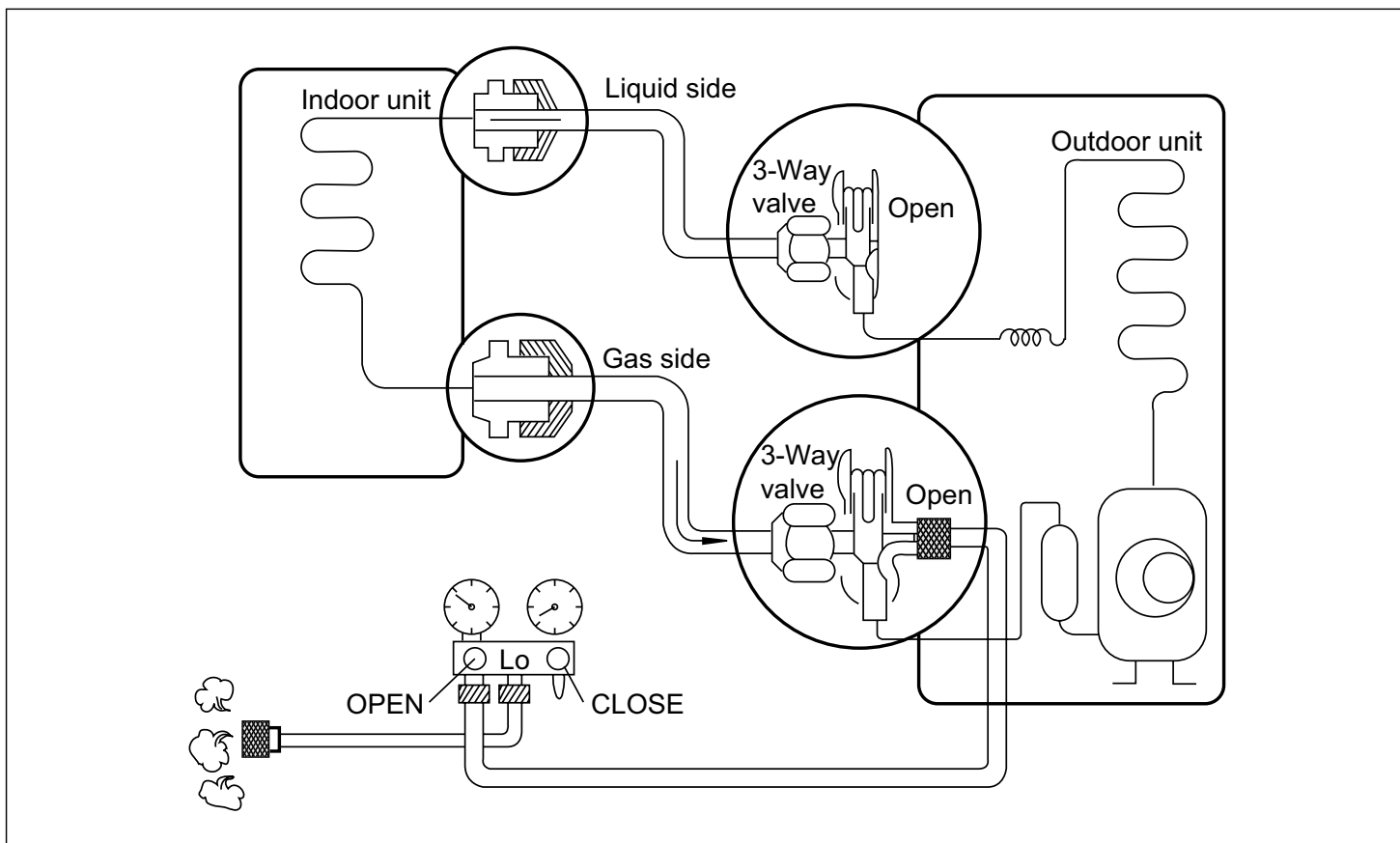
– Use torque wrench to tighten the service port nut to a torque of 1.8 kg.m.

– Be sure to check for gas leakage.

CAUTION: Do not leak the gas in the air during Air Purging.

Balance Refrigerant of the 3-way Valve

(Gas leakage)

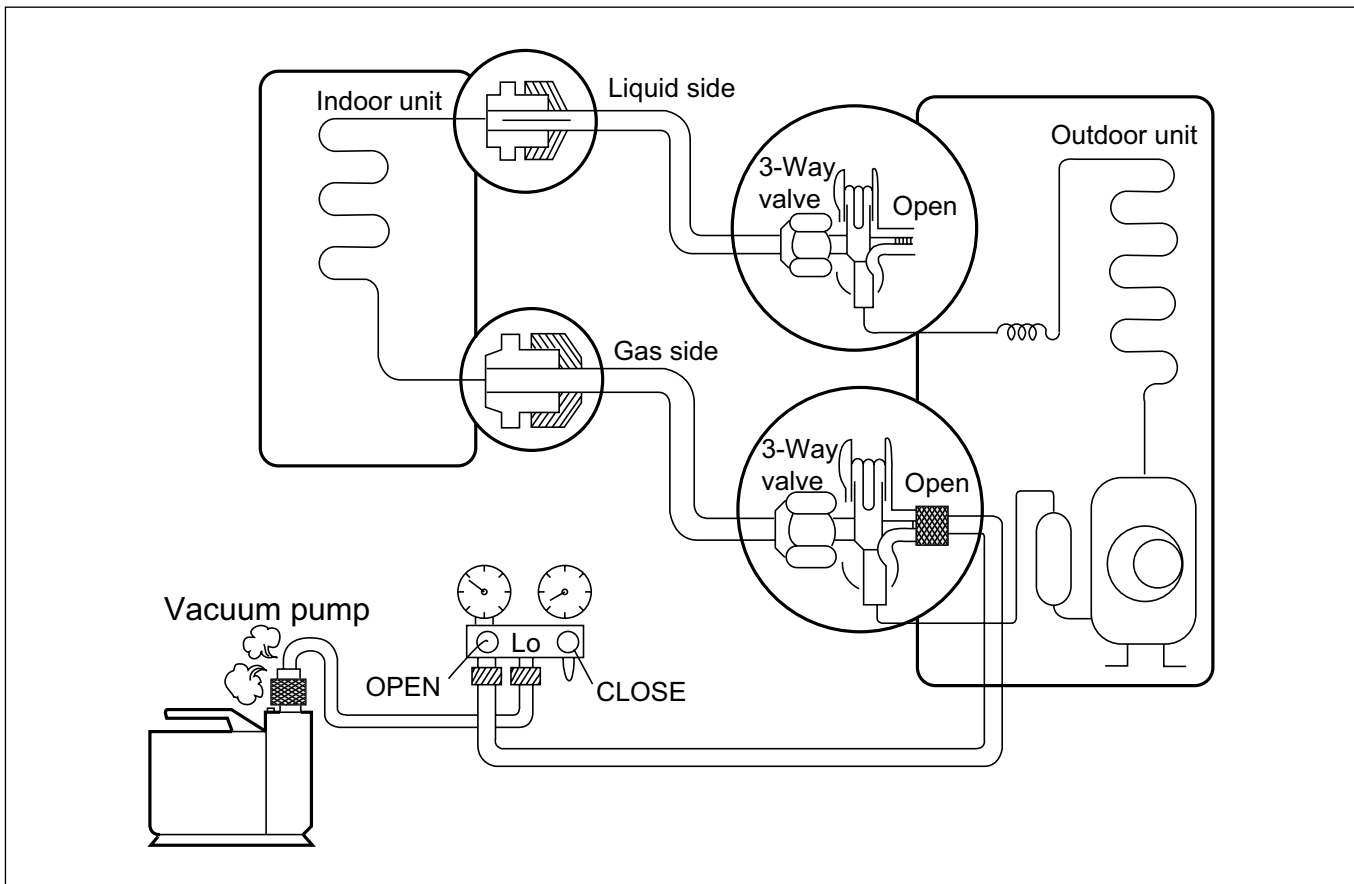


• Procedure

- (1) Confirm that both the 2-way and 3-way valves are set to the back seat.
- (2) Connect the charge set to the 3-way valve's port.
 - Leave the valve on the charge set closed.
 - Connect the charge hose to the service port.
- (3) Open the valve (Lo side) on the charge set and discharge the refrigerant until the gauge indicates 0 kg/cm²G.
 - If there is no air in the refrigerant cycle (the pressure when the air conditioner is not running is higher than 1 kg/cm²G), discharge the refrigerant until the gauge indicates 0.5 to 1 kg/cm²G. if this is the case, it will not be necessary to apply a evacuation.
 - Discharge the refrigerant gradually; if it is discharged too suddenly, the refrigeration oil will also be discharged.

Evacuation

(All amount of refrigerant leaked)

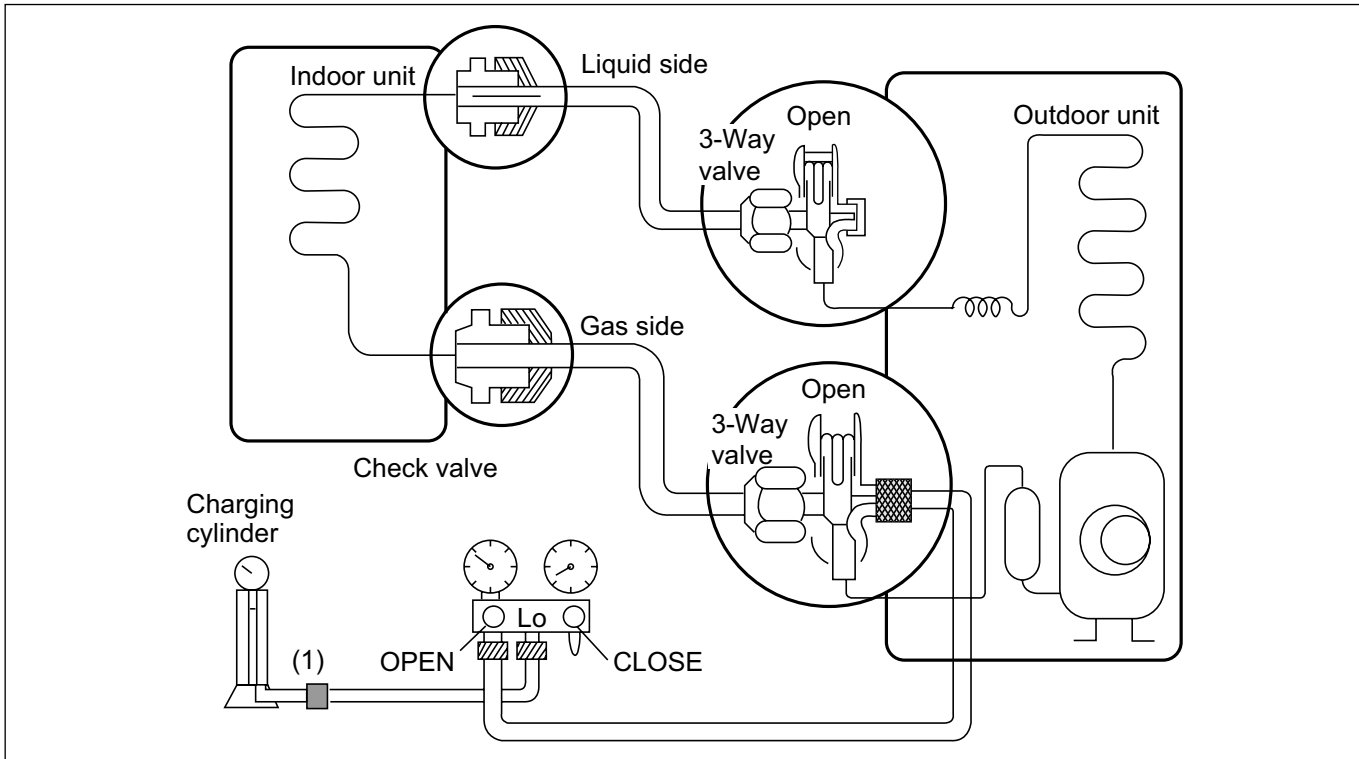


• Procedure

- (1) **Connect the vacuum pump to the center hose of charge set center hose**
- (2) **Evacuation for approximately one hour.**
 - Confirm that the gauge needle has moved toward -76 cmHg (vacuum of 4 mmHg or less).
- (3) **Close the valve (Lo side) on the charge set, turn off the vacuum pump, and confirm that the gauge needle does not move (approximately 5 minutes after turning off the vacuum pump).**
- (4) **Disconnect the charge hose from the vacuum pump.**
 - Vacuum pump oil.
If the vacuum pump oil becomes dirty or depleted, replenish as needed.

Gas Charging

(After Evacuation)



• Procedure

(1) Connect the charge hose to the charging cylinder.

- Connect the charge hose which you disconnected from the vacuum pump to the valve at the bottom of the cylinder.
- If you are using a gas cylinder, also use a scale and reverse the cylinder so that the system can be charged with liquid.

(2) Purge the air from the charge hose.

- Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air. (Be careful of the liquid refrigerant). The procedure is the same if using a gas cylinder.

(3) Open the valve (Lo side on the charge set and charge the system with liquid refrigerant.

- If the system can not be charged with the specified amount of refrigerant, it can be charged with a little at a time (approximately 150g each time) while operating the air conditioner in the cooling cycle; however, one time is not sufficient, wait approximately 1 minute and then repeat the procedure (pumping down-pin).

This is different from previous procedures. Because you are charging with liquid refrigerant from the gas side, absolutely do not attempt to charge with larger amounts of liquid refrigerant while operating the air conditioner.

(4) Immediately disconnect the charge hose from the 3-way valve's service port.

- Stopping partway will allow the gas to be discharged.
- If the system has been charged with liquid refrigerant while operating the air conditioner turn off the air conditioner before disconnecting the hose.

(5) Mount the valve stem nuts and the service port nut.

- Use torque wrench to tighten the service port nut to a torque of 1.8 kg.m.
- Be sure to check for gas leakage.

10. Removal Procedure

10.1 Removal Procedure of Indoor Unit

Procedure



Warning

Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

Image shown here is indicative only. Actual product you receive may differ.

1. Remove front panel

Open the front panel and slightly pull it to remove it.

front panel

filter



2. Remove guide louver

Push out the shaft sleeve and slightly bend the guide louver to remove it.

guide louver



3. Remove electric box cover

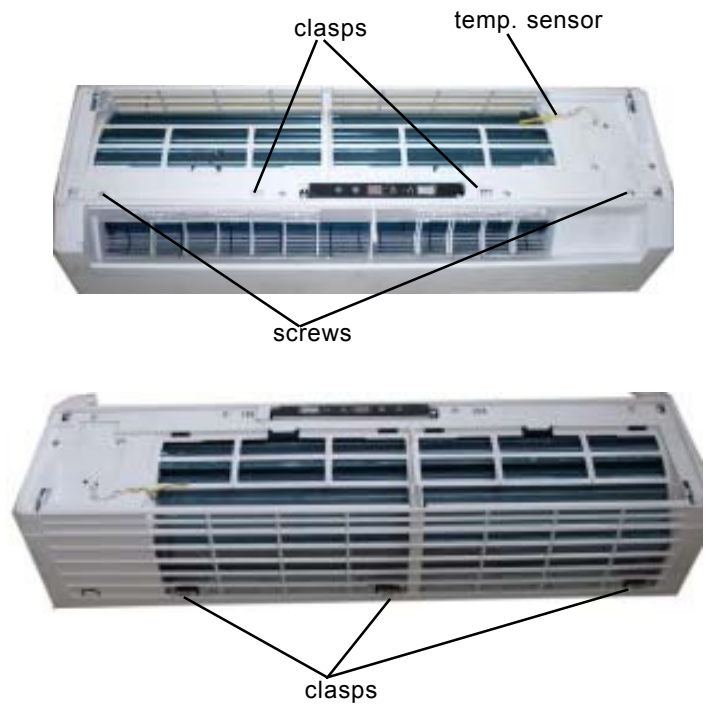
Unscrew the screw fixing the electric box cover to remove it.

screw



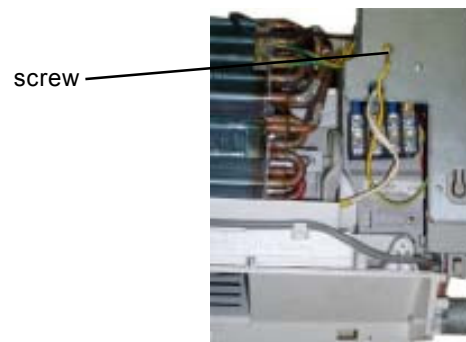
4. Remove front case

Unscrew the 6 tapping screws fixing the front panel and turn the front case backward to remove it.



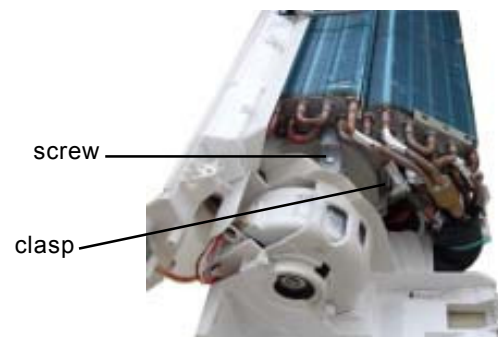
5. Remove electric box

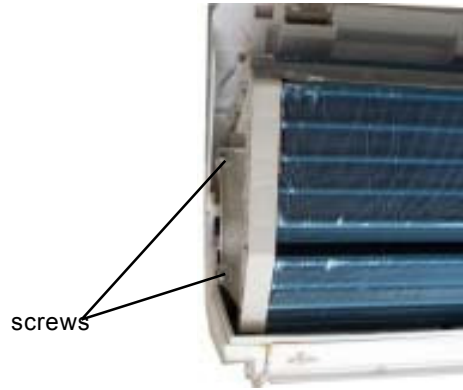
Unscrew the 2 screws fixing the electric box. Pull out the wiring terminal of motor and then unscrew the 3 screws fixing electric box. Lift the electric box to remove it.



6. Remove evaporator

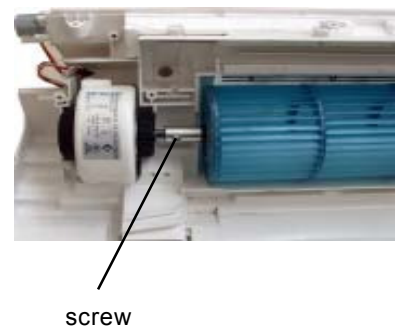
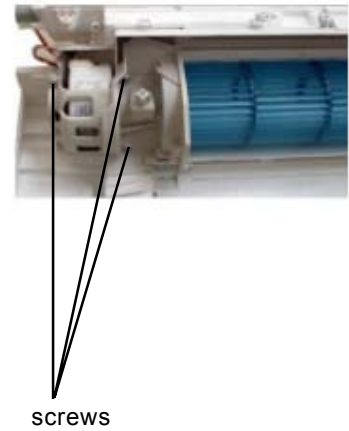
Unscrew the screws on the rear pipe cardplate and then remove the cardplate.





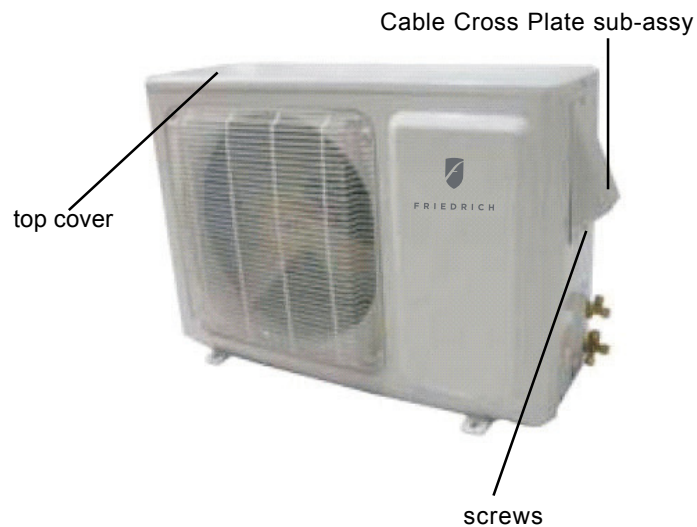
7. Remove motor and cross flow fan

Unscrew the screws fixing the motor press plate of motor and then the screws connecting the motor and cross flow fan to separate and remove them.

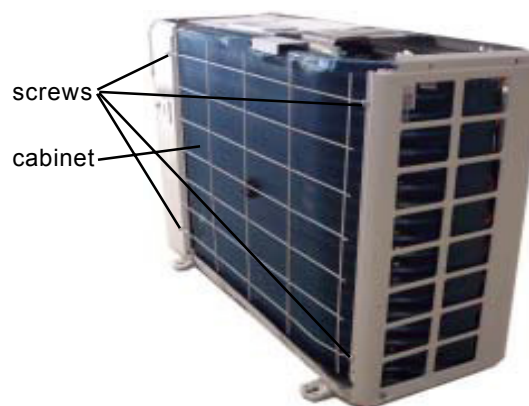


10.2 Removal Procedure of Outdoor Unit

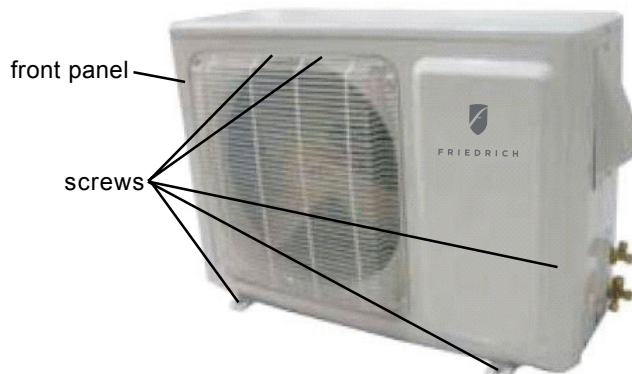
1. Remove top cover and the Cable Cross Plate sub-assy Unscrew the screw on the handle and pull the Cable Cross Plate sub-assy forcibly downwards to remove it. Unscrew the 3 screws fixing the top cover to remove it.



2. Remove cabinet
Unscrew the 4 screws fixing the cabinet to remove it.

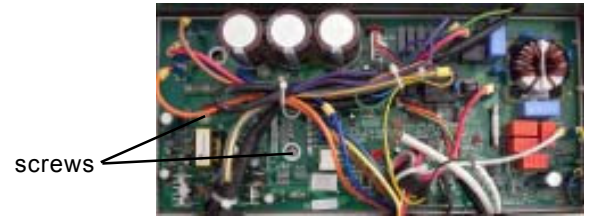


3. Remove front panel
Unscrew the 5 screws fixing the front panel and pull out the front panel to remove it.
(If it's 108-230V, there are 6 screws need to be unscrewed because there are one more power transformer.)



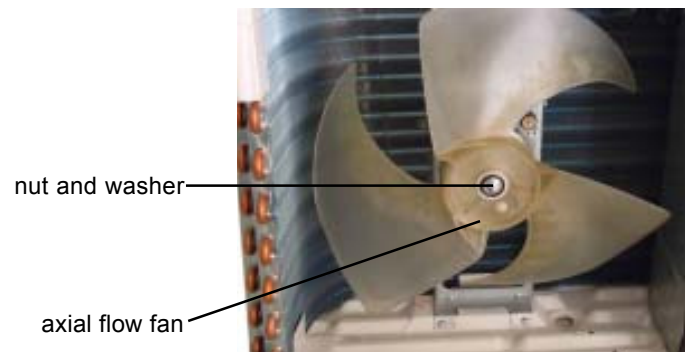
4. Remove electric box cover

Unscrew the 2 screws fixing the electric box. Pull the electric box upwards and unplug the plug-in line to remove the electric box.



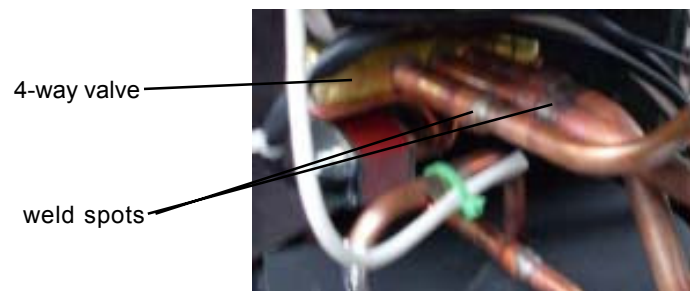
5. Remove axial flow fan

Unscrew the nut and remove the washer fixing the axial flow fan and then pull it out.

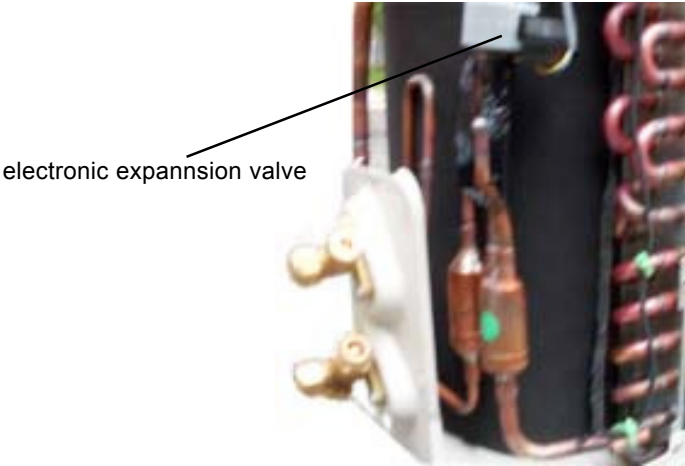


6. Remove 4-way valve

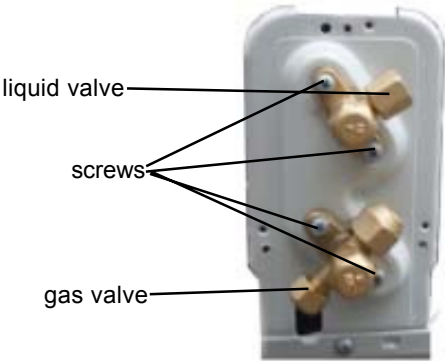
Wrap the 4-way valve with wet cloth and unsolder the 4 weld spots of the 4-way valve to remove it.



7. Remove electronic expansion valve
Unsolder the weld spots of electronic expansion valve connecting with other pipelines to remove it.



8. Remove gas valve and liquid valve
Unscrew the 2 screws fixing the gas valve and unsolder the weld spots of gas valve and suction pipe to remove the gas valve.
Unscrew the 2 screws fixing the liquid valve and unsolder the weld spots of liquid valve and suction pipe to remove the liquid valve.

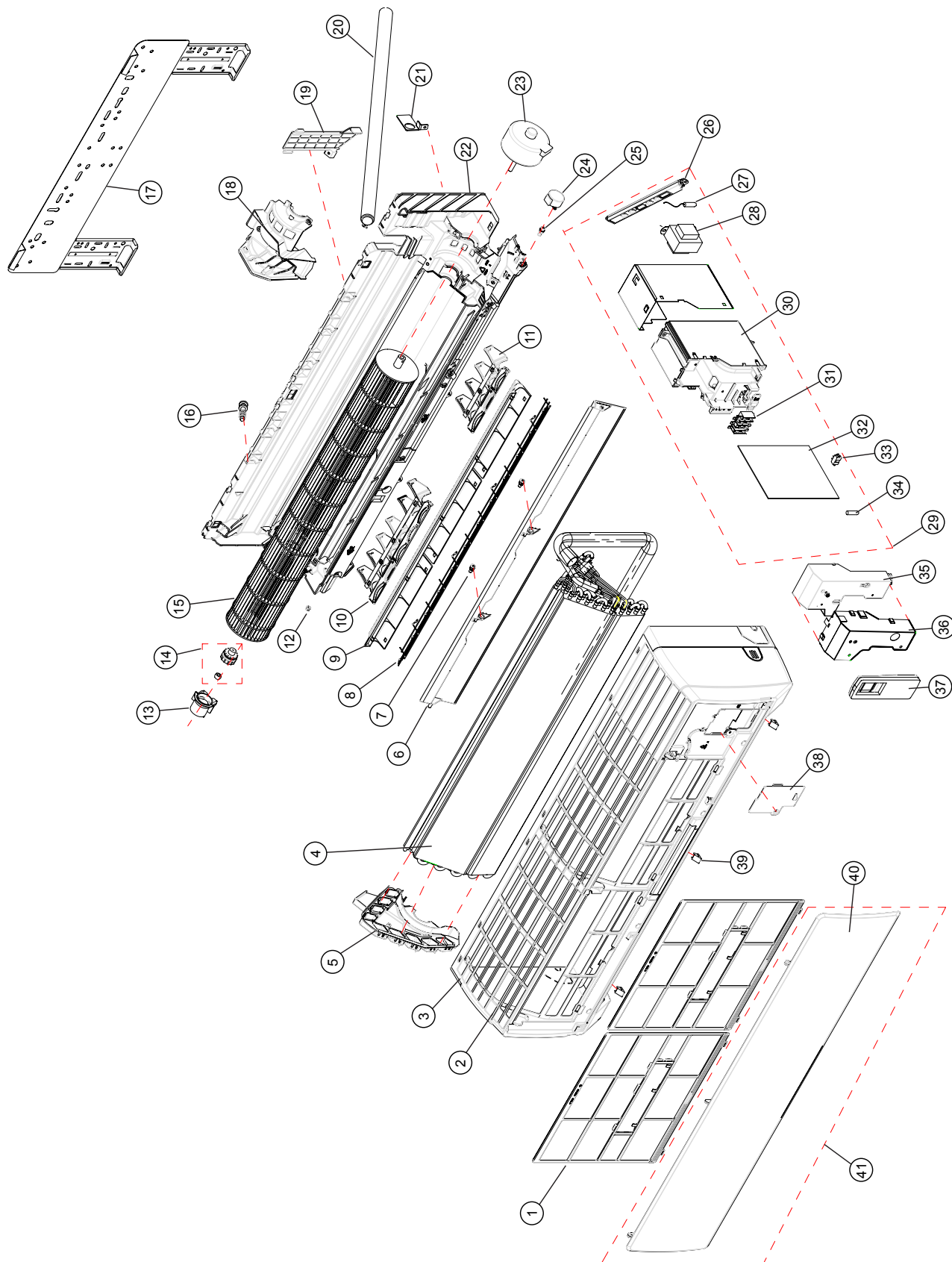


9. Remove compressor
Unsolder the 2 weld spots of the compressor and unscrew the 3 feet nuts and remove the washers fixing the compressor to remove it.



SPLIT TYPE ROOM AIR CONDITIONER - WALL MOUNTED SYSTEM COMPONENTS

MW09C1H / MW12C1H Exploded Diagram



MW09C1H Parts List

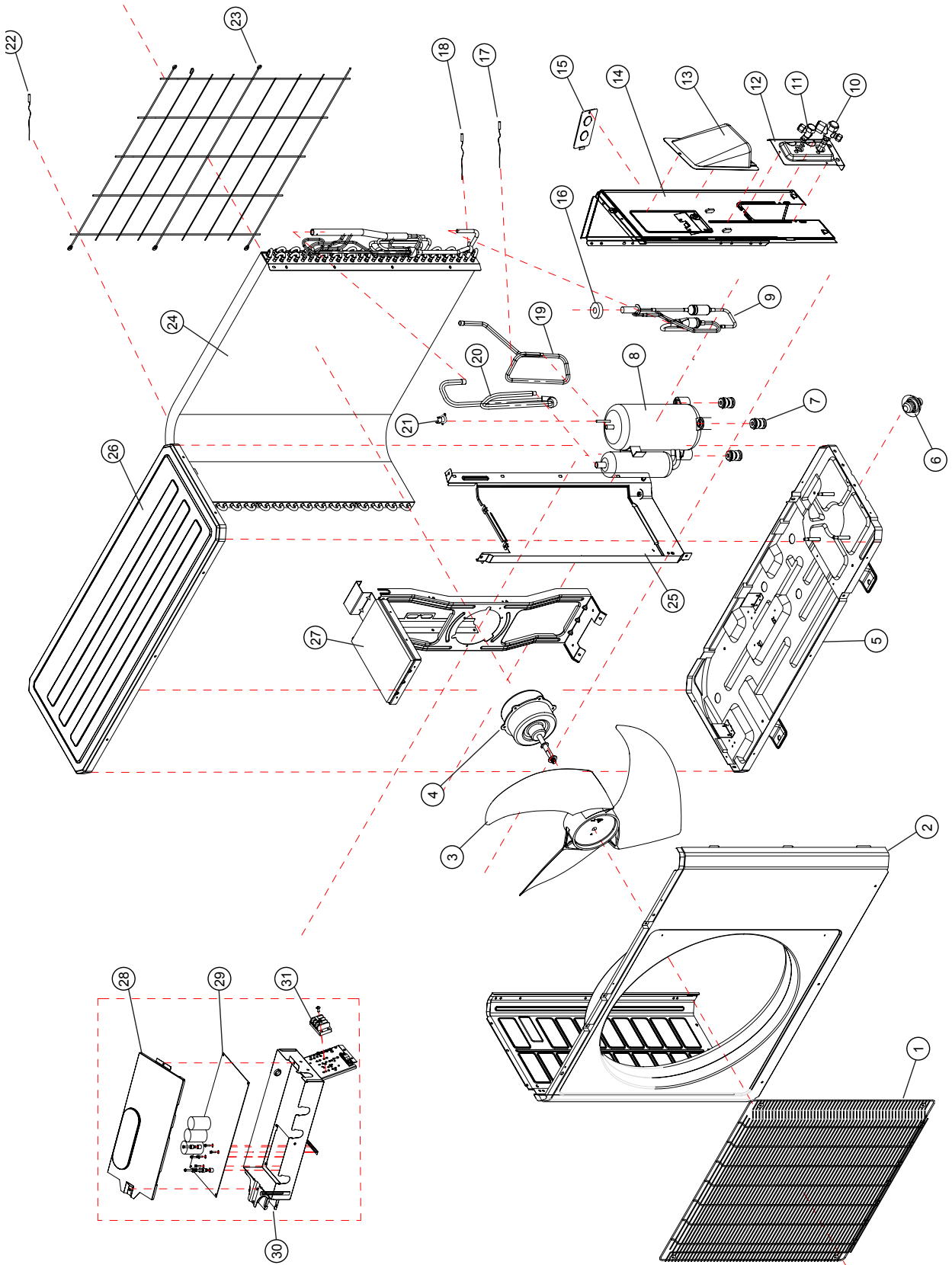
NO.	FPN	Part Description
1	69700100	Filter Sub-Assy
2	69700101	Front Case Sub-Assy
3	69700102	Front Case
4	69700103	Evaporator Assy
5	69700104	Evaporator Support
6	69700105	Guide Louver
7	69700106	Axile Bush (guide louver)
8	69700107	Rear Grill
9	69700108	Helicoid tongue
10	69700109	Air Louver 2
11	69700110	Air Louver 1
12	69700111	Left Axile Bush
13	69700112	Bearing cushion rubber base
14	69700113	O-Gasket sub-assy of Bearing
15	69700114	Cross Flow Fan
16	69700115	Water Tray Glue Plug
17	69700116	Wall Mounting Frame
18	69700117	MotorPressPlate
19	69700118	Pipe Clamp
20	69700119	Drainage Pipe
21	69700120	Cable Cross Plate
22	69700121	Rear Case assy
23	69700122	Fan Motor
24	69700123	Motor MP24AA
25	69700124	Crank
26	69700125	Display Board
27	69700126	Ambient Temperature Sensor
28	69700127	Transformer
29	69700128	Electric Box Assy
30	69700129	Electric Box
31	69700130	4-bit Terminal Board
32	69700131	Main Board
33	69700132	Jumping Connector
34	69700133	Tube Sensor (20K black)
35	69700134	Electric Box Cover1
36	69700135	Shield cover of Electric Box sub-assy
37	69700136	Remote Control
38	69700137	Electric Box Cover2
39	69700138	Screw Cover
40	69700139	Front panel D1
41	69700140	Front Panel Sub-Assy

MW12C1H Parts List

NO.	FPN	Part Description
1	69700100	Filter Sub-Assy
2	69700141	Front Case Sub-Assy
3	69700142	Front Case
4	69700103	Evaporator Assy
5	69700104	Evaporator Support
6	69700105	Guide Louver
7	69700106	Axile Bush (guide louver)
9	69700108	Helicoid tongue
10	69700109	Air Louver 2
11	69700110	Air Louver 1
12	69700111	Left Axile Bush
13	69700112	Bearing cushion rubber base
14	69700113	O-Gasket sub-assy of Bearing
15	69700114	Cross Flow Fan
16	69700115	Water Tray Glue Plug
17	69700116	Wall Mounting Frame
18	69700117	MotorPressPlate
19	69700118	Pipe Clamp
20	69700119	Drainage Pipe
21	69700120	Cable Cross Plate
22	69700121	Rear Case assy
23	69700122	Fan Motor
24	69700123	Motor MP24AA
25	69700124	Crank
26	69700125	Display Board
27	69700126	Ambient Temperature Sensor
28	69700127	Transformer
29	69700143	Electric Box Assy
30	69700129	Electric Box
31	69700130	4-bit Terminal Board
32	69700131	Main Board
33	69700144	Jumping Connector
34	69700133	Tube Sensor (20K black)
35	69700134	Electric Box Cover1
36	69700135	Shield cover of Electric Box sub-assy
37	69700145	Remote Controller
38	69700137	Electric Box Cover2
39	69700138	Screw Cover
40	69700139	Front panel D1
41	69700140	Front Panel Sub-Assy

SPLIT TYPE ROOM AIR CONDITIONER - WALL MOUNTED SYSTEM COMPONENTS

MR09C1H Exploded Diagram

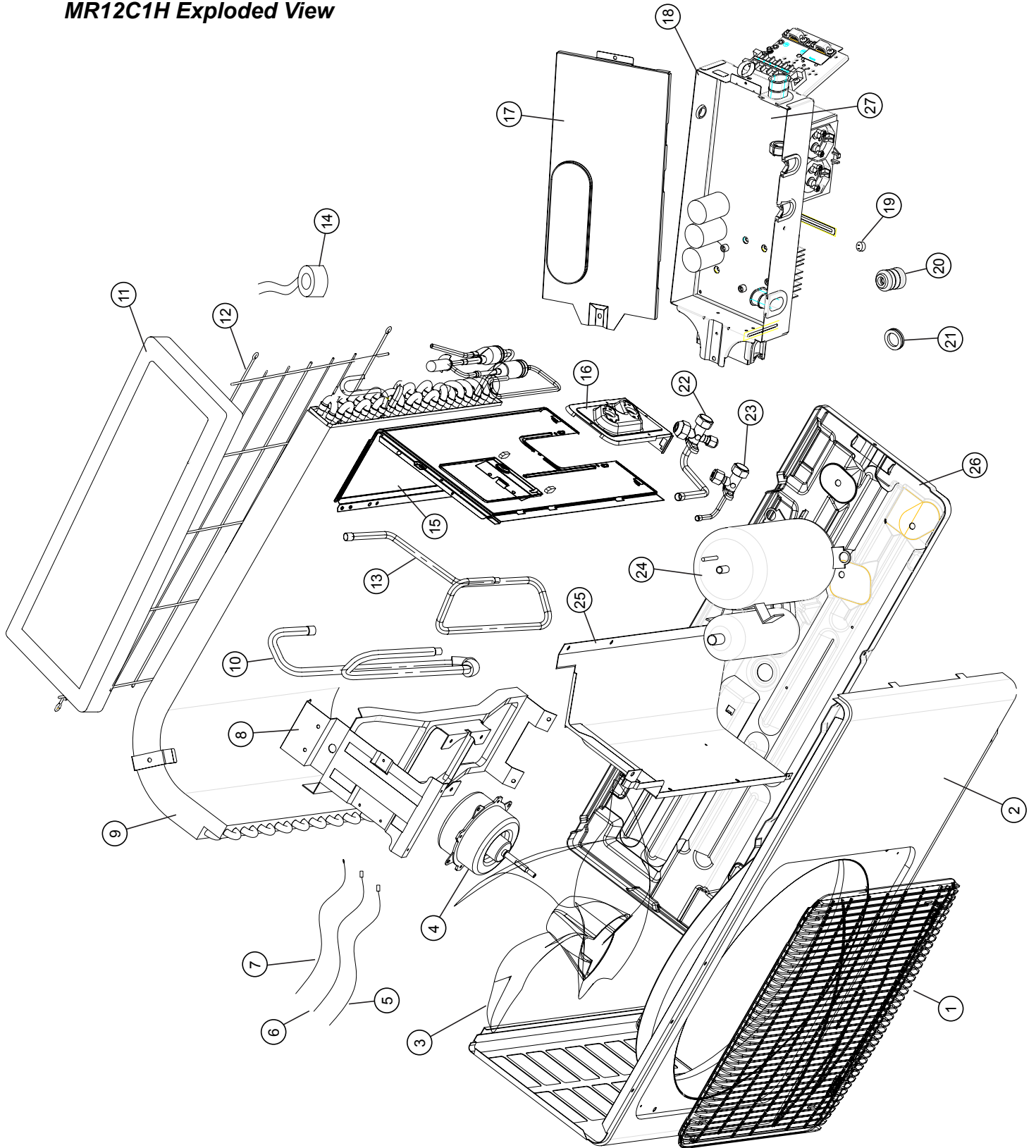


MR09C1H Parts List

NO.	FPN	Part Description
1	69700000	Mesh Enclosure
2	69700001	Cabinet
3	69700002	Axial-flow Fan
4	69700003	Motor FW30G-ZL
5	69700004	Reactor Support Assy
6	69700005	Choke Plug
7	69700006	Compressor Gasket
8	69700007	Compressor C-6RZ110H1A
9	69700008	Electric Expansion Valve Sub-Assy
10	69700009	Cut-off Valve (1/4)
11	69700010	Cut-off Valve (3/8)
12	69700011	Valve Support
13	69700012	Cable Cross Plate Assy
14	69700013	Right Side Plate Assy
15	69700014	Wire cover
16	69700015	Magnet Coil
17	69700016	Temperature Sensor for Discharge Gas
18	69700017	Tube Sensor (20K black)
19	69700018	Discharge Tube
20	69700019	Inhalation Tube
21	69700020	Overload Protector
22	69700021	Sensor
23	69700022	Rear Grill
24	69700023	Condenser Assy
25	69700024	Clapboard Sub-Assy
26	69700025	Top Cover Plate
27	69700026	Motor suport spot welding sub-assy
28	69700027	Electric box cover sub-assy
29	69700028	Main Board
30	69700029	Electric Box Assy
31	69700030	Terminal Board

SPLIT TYPE ROOM AIR CONDITIONER - WALL MOUNTED SYSTEM COMPONENTS

MR12C1H Exploded View



MR12C1H Parts List

NO.	FPN	Part Description
1	69700000	Mesh Enclosure
2	69700031	Front Panel
3	69700002	Axial-flow Fan
4	69700003	Motor FW30G-ZL
5	69700017	Tube Sensor (20K black)
6	69700016	Temperature Sensor for Discharge Gas
7	69700021	Sensor
8	69700032	Motor suport spot welding sub-assy
9	69700033	Condenser Assy
10	69700019	Inhalation Tube
11	69700025	Top Cover Plate
12	69700034	Rear Grill
13	69700035	Discharge Tube
14	69700015	Magnet Coil
15	69700036	Right Side Plate
16	69700011	Valve Support
17	69700027	Electric box cover sub-assy
18	69700029	Electric Box Assy
19	69700020	Overload Protector
20	69700006	Compressor Gasket
21	69700037	Drainage Plug
22	69700010	Cut-off Valve (3/8)
23	69700009	Cut-off Valve (1/4)
24	69700007	Compressor C-6RZ110H1A
25	69700038	Clapboard Sub-Assy
26	69700039	Chassis Sub-assy
27	69700028	Main Board



F R I E D R I C H

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